IAN ALLAN

17½p

MAY 1971

aircraft ILLUSTRATED

Wimpeys, plain and fancy • Siskin and Harrier paint schemes
The Davis gun • The Don Gentile story • Fire bombs in WWII

ABOVE: Hawker Siddeley Trident IE G-AVYC of Northeast breaks formation with the camera ship during a recent photographic sortie.

COVER: Three McDonnell Phantom FG1s of 43 Squadron, on detachment to RAF Luqa, Malta, fly in vic formation during the joint RAF/RN Exercise *Lime Jug* held in the Mediterranean last autumn.

aircraft ILLUSTRATED

MAY 1971

VOL 4 No 5

	News and views	169
Tommy Lucke	Wimpeys—plain and fancy	174
Michael H. Goodall	The Davis guns	180
Philaticus	Stamps	183
	In the wake of the superjet	184
	An unusual 'brown job'	185
Harry Holmes	Don Gentile	186
	Photofile	188
photo feature	Seven from Kenya	191
photo feature	Purposeful Phantom	192
J. D. Oughton	Fire bombs	194
James Goulding	Modelling world	198
David J. Kingston	USMC Harrier camouflage scheme	199
	RAF Museum progress	200
Alfred Granger and Philip J. R. Moyes	AW Siskin squadron markings—Part 1	201
Michael Stroud	British civil aircraft register	205
Peter R. March	Airview	206

Editor:
PHILIP J. R. MOYES

Annual Subscription Rates including postage. AIRCRAFT ILLUSTRATED: Home 50s/£2.50 Overseas (excluding North America) 60s/£3.00 AIRCRAFT ILLUSTRATED EXTRA (published quarterly): Home 17s/£0.85 Overseas (excluding N. America) 18s/£0.90 Combined AIRCRAFT ILLUSTRATED and AI EXTRA: Home 60s/£3.00 Overseas (excluding N. America) 75s/£3.75.

North American readers should book subscriptions with Bill Dean Associates, 166-41 Powells Cove Blvd, Whitestone, New York 11357, USA, and the following annual rates apply: AIRCRAFT ILLUSTRATED $7.50; AIRCRAFT ILLUSTRATED EXTRA $2.95; combined AIRCRAFT ILLUSTRATED and AI EXTRA $9.95.

Published by

IAN ALLAN LTD

TERMINAL HOUSE · SHEPPERTON · MIDDLESEX
Telephone: Walton-on-Thames 28484

NEWS & VIEWS

The prototype SEPECAT Jaguar tactical fighter—SO6— made its 200th test flight on March 17 from the Warton airfield of the British Aircraft Corporation. SO6 is currently involved in a programme of performance tests carrying different combinations of external stores. Jaguar SO7, which first flew in June 1970, is currently having its avionics equipment fitted at Warton ready for the next phase of the programme. Meanwhile, work continues on construction of the third British Jaguar prototype—a two-seater version designated BO8—ready for its first flight later this year.

Eleven orders have been received for the new 18 seat Britten-Norman Trislander (see December 1970 issue) and letters of intent have been received for several more. Aurigny Air Services in the Channel Islands who already operates a fleet of twin-engined Islanders has ordered 3 Trislanders and will be the first airline to start operations with the new aircraft. Eight other firm orders have been placed by BN distributors covering North, Central and South America and the Caribbean.

Aurigny's eight Islanders are operated in its highly successful three year old inter-island network which has connections to both England and France. It is trading in some of its existing aircraft in order to be in a position next year to cope with the consistent growth in its traffic. Delivery of Aurigny's first Trislander is scheduled for July, the second for November and the third for February next year.

The Zambia Flying Doctor service has ordered five Britten-Norman Islander aircraft, the first two of which were officially handed over at Bembridge on February 25. The Islanders are of the 300hp type, with twin Lycoming fuel-injected IO-540K engines introduced in November last year as an alternative to the standard 260hp version, giving better performance to operators in the "hot and high" parts of the world. The aircraft, which also have extended wing tips containing additional fuel tanks, will operate from a base at Ndola and serve remote clinics in Zambia alongside short bush strips created for the Flying Doctor Service.

Nearly 240 Islanders have now been delivered to 48 countries.

The Banco de Brasil has ordered a Hawker Siddeley HS125 Srs 400 executive jet, bringing the total order book to 239 aircraft, of which 192 have been for export. This is the eighth HS 125 to be operated in Brazil. Six are in service with the Brazilian Air Force—five as

The first McDonnell Douglas DC-10 in United Air Lines colours which, on December 23, 1970, became the third of the new tri-jetliners to fly. A total of five DC-10s will be assigned to the certification programme and the type is expected to enter airline service later this year.

VIP transports, and one for sophisticated airways calibration. The remaining aircraft is operated by the Government of Sao Paulo.

The Series 200 Jetstream has received ARB approval on handling, following the successful completion of trials, and efforts are being made to complete certification this month in time for a debut at Paris. Jetstream aircraft is negotiating to buy the aircraft, which is one of those brought by Cranfield College of Aeronautics from the Handley Page receivers. Test flying is being carried out at Cranfield by J. Allam, former chief test pilot of Handley Page, under the auspices of Scottish Aviation who is providing technical support for the Jetstream 200 production programme

An RAF Nimrod has recently won the coveted Fincastle Trophy, which is competed for annually by maritime patrol aircraft of four Commonwealth nations and is symbolic of supremacy in anti-submarine warfare. The other Commonwealth aircraft competing were a Canadian Armed Forces Argus, a Royal New Zealand Air Force Orion and a Royal Australian Air Force Neptune. Competitors had to find and attack a submerged submarine lurking in a large area of sea both at night and during the day. Flight Lieutenant Keith Merrett of 201 Squadron, from RAF Kinloss, piloted his Nimrod through to victory in the second RAF win since the competition started in 1964. The Fincastle Trophy, held for the past three years by the RAAF, was presented to the Commonwealth air forces by Mrs Aird Whyte in memory of her son.

RAF St Athan completed the major servicing of its 100th Vulcan B2 bomber on February 9. The aircraft, XM605, was handed over to Wing Commander Eric Macey, officer commanding 101 Squadron, who flew it to RAF Waddington, Lincs. RAF St Athan has been carrying out major servicing of V-bombers since 1958. In 46 working days, a Vulcan can be completely stripped, the individual components serviced, the airframe checked for cracks and corrosion, and the aircraft re-assembled, painted and test flown. Up to four Vulcans can be handled at once, in addition to similar work being carried out on Victor tankers Canberras and Hunters. Over 300 V-bombers of all types have passed through St Athan's workshops. Vulcan B2s and Victor tankers form the backbone of RAF Strike Command's long-range attack force, together with Buccaneer S2s.

Dan Air recently acquired a Boeing 707 from Pan Am for use on North Atlantic and other long range charter flights. Registered G-AYSL, it isseen here at Newcastle during crew-training.

[A. M. Sinclair

Saturn Airways has ordered a fourth Lockheed L-100-30 freighter which will increase the carrier's Hercules fleet to seven aircraft. Delivery will be in the second quarter of 1971. The first of three previously-purchased -30s, appropriately named *Schozz* (photo), was delivered in December. The other three are -20s.

'Defender' is the name of a new version of the twin-engined Britten-Norman Islander being offered for government/military operations. Provision is made

The second Lockheed TriStar, which first flew on February 15, wearing the livery of TWA.

on the Defender for armament installations including underwing bombs and rockets and additional weapons mounted inside the cabin. A prototype is to appear at the Paris Air Show.

The Canadian Department of Supply and Services has ordered 25 Beech Musketeer Custom 3 aircraft for the Department of National Defence. The aircraft will be used in the pilot selection and primary flying training programme of the CAF, replacing the Chipmunks which have been in service since 1948. Delivery of the Musketeers will be made between March and September of this year. The aircraft will operate from CFB Portage La Prairie, Manitoba.

Latest sales of DH Canada Twin Otter Srs 300s are to Air Madagascar which has ordered two, and Royal Nepal Airlines, which also has ordered two.

Following the report in the March issue of an order from the French Government for an additional six Canadair CL-215 water-bombers, which was based on a statement by the Canadian Minister of Industry and Commerce and Canadian press reports the French Minister of National Defence has pointed out that no such order has, in fact, been placed. The Minister states that negotiations are continuing between the two governments for the purchase of one additional CL-215.

The first General Dynamics F-111F fighter-bomber is now in assembly and is due to leave the Fort Worth plant in early Jnue and make its first flight in August. The F-111F is the fourth fighter-bomber in the Tactical Air Command series and has two up- rated Pratt and Whitney TF30-P-100 engines ot give it considerably better performance than the earlier versions.

The USAF has cut its order for flight test prototypes of the North American Rockwell B-1A strategic bomber from five to three. In addition, there will now be only one static test airframe.

Sikorsky Aircraft has claimed the world helicopter speed record for its S-67 Blackhawk. The helicopter gunship flew the 15-to-25km course on December 19, 1970, at a speed of 220.6mph, breaking the former record of 217.7mph established by a French Sud Super Frelon in 1963. The 220.6mph is not only a record for the 15-to-25km course but is the top speed officially recorded for a helicopter. This was the second record established by the Blackhawk within one week. On December 14, the Blackhawk set a record for the three kilometer course with a speed of 216.72 mph. Both flights were observed and monitored by officials of the National Aeronautics Association, representing the Federation Aeronautique Internationale (FAI), the organisation which certifies world aviation records.

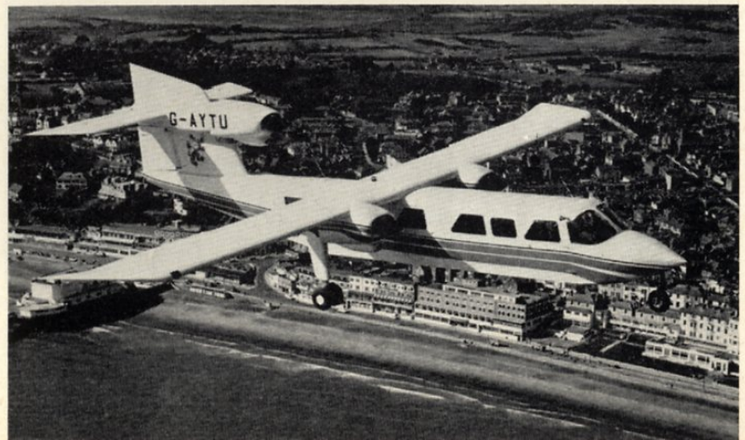
Piper Aircraft Corporation has begun production of an economical two-seat Cherokee trainer called the Flite Liner. Produced in Vero Beach, Fla, the new version of the time-proven Cherokee PA-28 has been developed primarily for use by Piper's 400 'Flite Centres' which train students to complete private pilot ratings. The Flite Liner has a 150hp Lycoming engine providing 142mph top speed and 132mph cruise.

Cessna Aircraft Company has, for the second time in its history, delivered more than half of all general aviation aircraft made by US manufacturers. Cessna now has led all other aircraft manufacturers for 15 consecutive years. Industry delivery figures show that, during 1970, Cessna delivered 51.3 per cent of all business, personal and utility aircraft. This figure also represents Cessna's best percentage market share in the company's 43-year history.

Since 1956, Cessna has led all other manufacturers in total aircraft delivered and 1970 marks the second time the company has topped the 50 per cent level of deliveries. The last time was during 1966, when Cessna recorded 50.1 per cent of the general aviation deliveries. In 1967, Cessna became the number one producer of twin-engine aircraft and, since, then the company has led general aviation manufacturers in multi-engine deliveries in three of the past four years including 1970.

National Airlines has increased its order for DC-10s from nine to 11. The extra two aircraft will be handed over in mid-1973.

The first of nine Breguet Atlantic long-range maritime reconnaissance aircraft for the Dutch Navy made its first flight



The first production Trislander, which flew on March 6, in the colours of Aurigny Air Services. See news item.

LEFT: A Harrier of 1 Sqn, RAF Wittering, fires a salvo of SNEB rockets during a recent armament practice camp in Sardinia.

BELOW LEFT: Second prototype Scottish Aviation Bulldog, G-AXIG, first flew on February 14. Although wearing Swedish AF colours it is not destined for the service but will join G-AXEH in sales and demonstration flying. [Gordon Bain

from Toulouse-Colomiers on January 30 and was scheduled for delivery in April. The remaining eight aircraft will be delivered by the end of the year. So far, 87 Atlantics have been ordered, of which 60 are already in service in France and West Germany.

Dassault has announced the existence of the Falcon 20T, a light commuter aircraft for third-level traffic, seating 24 passengers and having the wing, engine pods, engines and tail of the Falcon 20 but a completely new fuselage. The prototype will appear later this year.

The Belgian Ministry of Defence has signed a letter of intent to buy 12 Lockheed Hercules transport aircraft worth £23m. The purchase is a two-way industrial programme under which Belgian firms will receive work worth £13.5m—more than half the cost of the aircraft—from the US in the next 10 years. Six of the Belgian Hercules will be delivered next year and six in 1973. Belgium is the 23rd nation to buy Hercules. Over 1200 have been sold and in world wide service have amassed over 6 250 000 hours flying time.

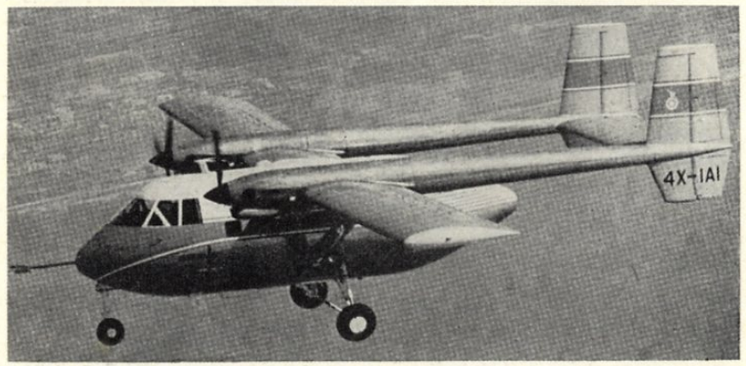
Sabena has ordered two McDonnell Douglas DC-10-10s for delivery at the end of 1973. Sabena is the first scheduled airline to order the convertible version of the DC-10, in which the cabin can be used to contain 255 passengers or 22 pallets of cargo, or 115 passengers and eight pallets. The new Sabena aircraft will be used for the company's long distance flights, especially those to Tokyo and Montreal.

First flight of the VFW-Fokker 614 twin-turbofan short-haul transport, which was rolled out on April 5, will be delayed for several months due to the delivery of flight-qualified M45 engines by Rolls-Royce.

The first production SAAB AJ37 Viggen supersonic multi-purpose STOL aircraft flew for the first time on February 23 at Linköping. Deliveries of the first of the 175 Viggens so far ordered for the Swedish Air Force are due to begin during the summer.

Danair SA is the name of a new Danish domestic airline established by SAS, Maersk Air and Cimber Air. The new airline will operate 12 of the current Danish domestic routes, using Caravelles and Metropolitans from SAS, a Fokker Friendship and an HS748 from Maersk Air, and a Nord 262 from Cimber Air. The aircraft will be leased from the parent company on an hourly utilisation basis.

Union de Transports Aérien took delivery in January of two Britten Norman BN-2 Islanders for operation in the New Hebrides by **Air Melanesie.** Since 1968, UTA has taken delivery of eight Islanders, the majority of which have been introduced into service with associated African airlines.



Among the exhibits at the forthcoming Paris Air Show will be the second prototype of the Israel Aircraft Industries Arava twin-turboprop STOL transport, 4X-IAI.

RIGHT: Where d'ya wannit, guv? A Sikorsky S-64E Skycrane lifted a complete house recently to demonstrate a new concept of aerial delivery of assembly line-produced dwellings from factory to homesite.

BELOW RIGHT: Recently making its maiden flight was the Cessna XMC research aircraft, built to evaluate many new light aircraft concepts for possible incorporation into Cessna's production designs.

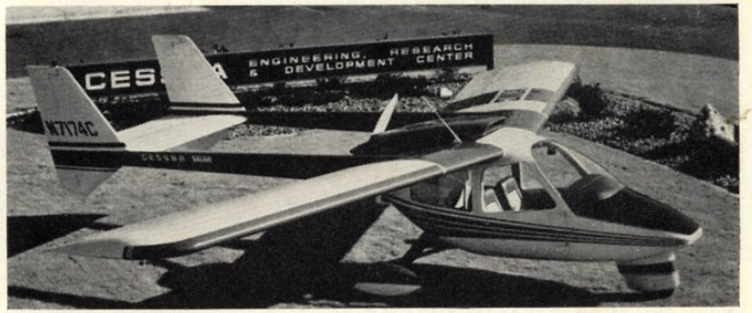
Spantax, the Spanish charter operator, is planning a considerable expansion of its services with the introduction of additional aircraft this year, reports *Interavia Air Letter*. The airline is scheduled to acquire three more Convair 990As, bringing its fleet of the type to eight. In addition Spantax will put two DC-8-54s into service.

THY Turkish Airlines has recently leased two Boeing 707-320s from Pan Am to operate pilgrim flights to Mecca, Saudi Arabia. The two aircraft are believed to be on a medium/long lease.

Middle East Airlines has bought six refurbished ex-American Airlines Boeing 720Bs. When the stop-gap Convair 990As used by MEA are returned to American, MEA will have an all-Boeing fleet comprising three 707-320Cs and nine 720Bs.

United Arab Airlines leased two Ilyushin Il-18s in January, one from Aeroflot and one from the Rumanian carrier Tarom.

Sukhoi SU-7s of the Indian Air Force were publicly displayed for the first time in the flypast during India's Republic Day Parade in January, when 27 SU-7s and 16 MiG 21s comprised the supersonic element.



We also regret that we cannot supply prints of any photographs which appear in AIRCRAFT ILLUSTRATED or AI EXTRA, but readers are advised that a wide range of photographs is available at normal rates from private sources who frequently advertise in this magazine.

Extra! Extra!

Don't forget to obtain your copy of issue 8 of AIRCRAFT ILLUSTRATED EXTRA (17.5p from booksellers or 20p direct from the Retail Department of Ian Allan, post paid) which is devoted to Flying Boats and Floatplanes 1914-1945 and contains articles on Britain's fighting 'boats of WWI, the Fairey III series of floatplanes, the Short Singapore III, the Supermarine Southampton and the Short Sunderland. There are plenty of superb photographs and a special attraction is a detailed Fairey III type and production list. And of course, there are more exciting additions to the "Aircraft Album" series of large colour photographs. Look for this issue with the Hansa-Brandenburg floatplane on the cover and get your copy NOW.

Postal Charges

Owing to the recent substantial increases in postal charges we regret that we can no longer undertake to return unsolicited manuscripts and photographs which we are unable to accept for publication in AIRCRAFT ILLUSTRATED or AIRCRAFT ILLUSTRATED EXTRA unless adequate return postage is enclosed. Readers should also note that we cannot undertake to reply to their queries unless an SAE is enclosed, and in any case we are not able to devote time to queries which involve extensive research.

Another new exhibit at the Paris Air Show will be the Dassault Mercure short-range twinjet airliner seen here in February just after its starboard wing had been fitted.

Ex test pilot TOMMY LUCKE reminisces about

Wimpeys—plain and fancy

Marks IC & II

BEFORE joining Vickers-Armstrongs, Ltd, in May, 1940, my experience of Wellington aircraft was limited to a few flights, mostly of a routine nature, from Boscombe Down. However, two flights which I remember well were a bit out of the ordinary. On the first I acted as second pilot to an Australian squadron leader in a Wellington IC during a return flight to Paris *via* Chateaudun. Before leaving Paris for home, the crew was laden with " goodies " provided by the Red Cross at throw-away prices, rather than that they should fall inevitably into the hands of the advancing Germans. The date was April 4, 1940.

Our homeward leg involved an 80 sea-mile crossing between Le Havre and Shoreham, and our Wellington carried no guns. Halfway across the Channel we became somewhat perturbed when three tri-motor aircraft were sighted from the astro dome. They were on a converging course and were overhauling our Wellington too rapidly to be mistaken for Ju 52s. Great was our relief when they came alongside and were recognised as converted Savoia Marchettis wearing the livery of Sabena. We later discovered that they had escaped from Belgium and had made a safe landing in England.

Six days later, my log book reminds me, I carried as passengers in another Wellington IC two distinguished navigators, Sqn Ldr David Waghorn, AFC, and Mr Francis Chichester. The object of their joint exercise was to compare the respective merits of two types of sextant, and the accuracy with which they were able to direct me back over the aerodrome above a solid layer of stratus cloud was quite uncanny.

Just before leaving Boscombe Down I carried out a series of airscrew tests on Wellington II L4250 which was the production prototype of that mark and which later became the first aircraft to carry a 4000lb bomb. These flights afforded a chance to compare a Mark II with the IC which I had flown previously. While the Mark II had a better all round performance and an improved range, I preferred the handling characteristics of the IC which showed no tendency to swing to port on take-off as did all aircraft I have flown fitted with Rolls-Royce engines. This tendency was particularly marked in the Avro York which I flew some years later.

DWI

In June 1940 I was sent from Brooklands to Croydon to collect, flight test and deliver a Wellington DWI. This was a Mark IA carrying special equipment fitted by the Redwing

"Eventually more Mark Xs than any other mark of Wellington were built, and this version was more efficient by far than its predecessors."

Company and designed to detonate magnetic mines lying in shallow water. It consisted of a streamlined coil, 48ft in diameter, hung from the nose, rear fuselage and outer wings of the aircraft. Power came from a 35kw generator driven by a Ford V8 engine, both mounted within the fuselage. Later versions, known as DWI Mark IIs, carried a 90kw generator driven by an air-cooled Gipsy VI engine and this equipment produced a greatly-increased magnetic field.

There was no particular problem in flying this cluttered-up aircraft except for the increase of drag on take-off, which had the effect of making Croydon seem exceedingly small. The drag could be reduced to a minimum only by getting the tail well up during the take-off run. Once airborne, the appendages had very little effect on general handling, but there was, of course, a reduction in speed.

The DWI was operationally a success round the coasts and estuaries of the UK, and in the Mediterranean, and mystified countless people who saw it flying. I once heard a man describe it as a vast lifebelt to be dropped alongside ships in distress!

Mark IV

Soon after the bombing of Brooklands in September 1940, all experimental aircraft were sent to Blackpool, where Vickers had a ' shadow factory ' at Squires Gate. Because of its geographical position, this aerodrome was much less vulnerable to bombing than was Weybridge. Test flying of the Wellington Marks III, V and VI and the Warwick prototypes was continued undisturbed by enemy action. Most of the flying was done by Maurice Summers with help from David Waghorn, " Shorty " Longbottom, and with R. C. Handasyde usually acting as observer. Meanwhile I was at the Chester shadow factory giving a hand to Maurice Hare who was busy flying the prototype Mark IV, fitted with Pratt & Whitney 1830 engines. It was Maurice Hare who was flying the prototype Wellington from Martlesham Heath before the war when he was catapulted through his cockpit canopy after a tail member failed in a dive and the Wellington tried to do a bunt. We shared Chester with a Spitfire OTU and a unit of the ATA.

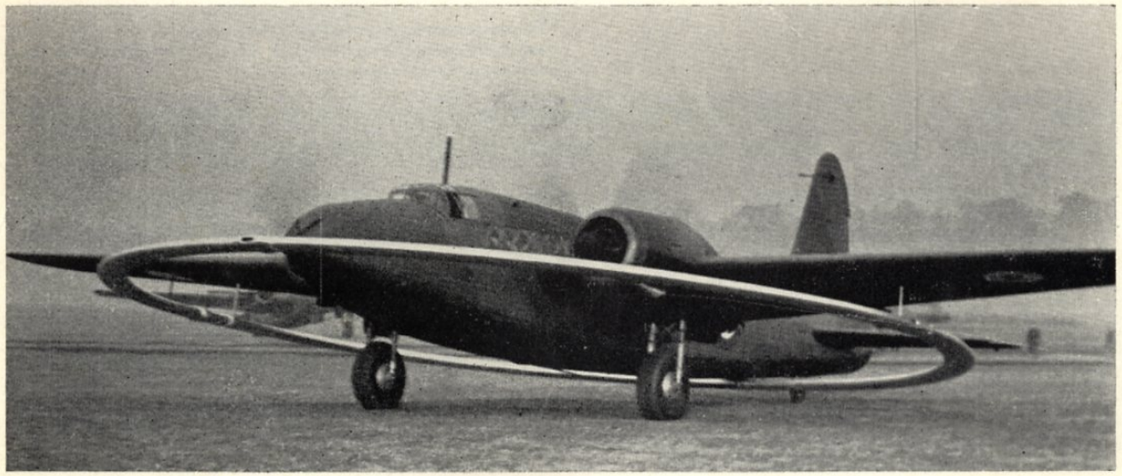
My own flying was confined largely to Mark ICs still coming off the production line at Chester, with a few flights on the early Mark IVs to add variety. There is little I can remember about this mark except for the atrocious noise it created. This was reduced somewhat by modifications to the airscrews. I recall the aerodrome at Chester very well, for it was wholly of grass at the time and was built at a level below that of the River Dee, the western bank of which formed one boundary. After rain the whole aerodrome became water-logged, and our Wellingtons were forced to use a strip of perimeter track about 400 yards long, approached between factory and flight shed for a landing. The pupil pilots of the OTU had to make do with the grass surface, whatever the conditions, and very often came to grief. I have seen as many as six aircraft standing on their noses in one day. Vickers, having been first on the scene, named the aerodrome " Broughton ", the name of the nearest village to its factory. The RAF, based on the northern end, and using Gladstone's Hawarden Castle as the officers' mess, called the place Hawarden. Very confusing.

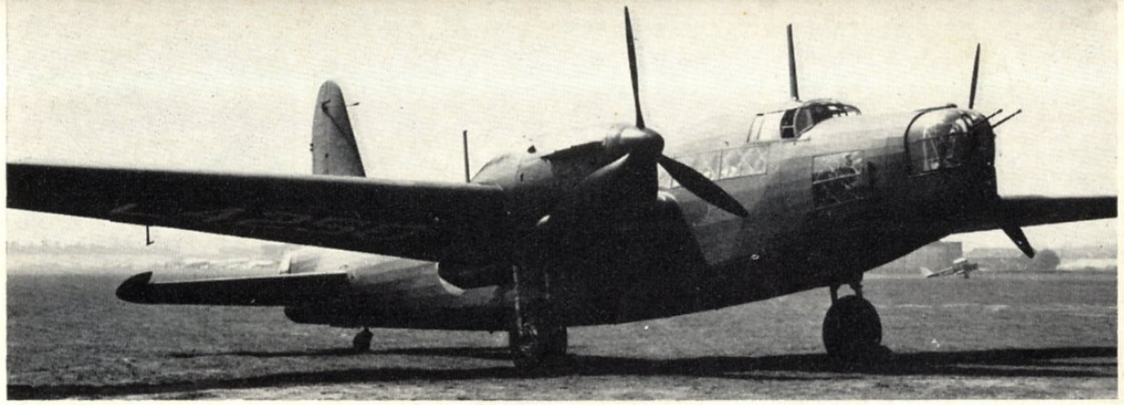
Mark III

Soon it was time to return to Squires Gate where P9238, the production prototype Wellington III, was ready for trials. This aircraft was fitted with Hercules III power packs which were later superseded by the Hercules XI. The designed all-up weight was 28 000lb, but in its final form the Mark III was to fly at 34 500lb. The airscrews were Rotol electric of 12ft 6in diameter.

Right from the start the Wellington III was a delight to fly and, lightly laden, was highly manoeuvrable. It could be looped with ease, and I once saw one do a rather dangerous-looking barrel roll. However, it was not long before trouble began to be experienced with the airscrews, and I chalked up a good number of single-engine landings after having had to feather an airscrew which had run away. This was due to a fault in the airscrew governing system which persisted for some months uncorrected. Messrs

"The DWI was operationally a success round the coasts and estuaries of the UK, and in the Mediterranean, and mystified countless people who saw it flying."





"Just before leaving Boscombe Down I carried out a series of tests on Wellington II L4250 which was the production prototype of that mark and which later became the first aircraft to carry a 4 000lb bomb."

Rotol at last found the answer, but not before Vickers was on the point of discarding Rotol electric airscrews entirely.

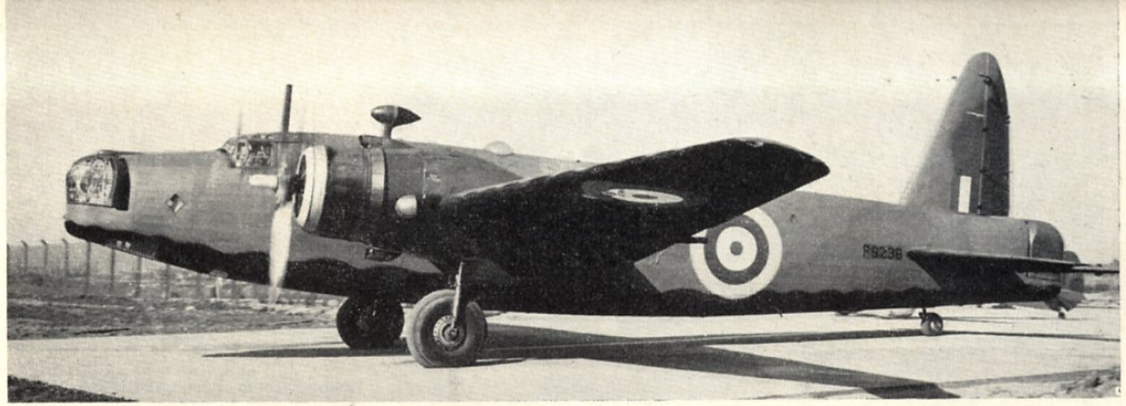
By this time there was quite a backlog of undelivered Mk IIIs cluttering up the aerodrome, and matters had become very serious. Through trial and error a method was found to enable the ATA to collect aircraft and ferry them to various MUs. This involved ground running each engine and setting the max revs at 2 450 by using the toggle switch on the airscrew controls. Thereafter, the toggle switch was wired in the neutral position and the airscrew became, in effect, a fixed-pitch airscrew. At full throttle during take-off and climb the boost and revs rose as speed increased, but stayed within permissible limits. Acceptable cruising conditions were obtained by reducing the boost. On arrival at destination, the pair of "slave" airscrews would be detached and returned to Squires Gate by road to be fitted to the next Wellington due to go. This went on for some months, and the technique had to be demonstrated to each new ATA pilot as he arrived to collect an aircraft. Messrs Rotol gave me an excellent lunch for having dreamed up this method and tried to press on me nine Drambuies—one for each of the forced landings I had had to carry out during the preceding week!

As flight tests continued on the prototype, it was found that as height was increased and the ambient temperature fell, the oil temperature readings were liable to increase. This was often followed by a drop in oil pressure if the conditions were allowed to continue unchecked. It was then found that the circular oil coolers would operate normally again only if height was reduced and the air temperature became higher. This was quite a setback, and to begin with caused something like consternation.

With a minimum loss of time, radiator shutters were fitted to the oil coolers. These were hydraulically operated and manually controlled, the knobs being located on the pilot's seat platform. The shutters effectively disposed of the oil cooling problems previously experienced, but they had to be operated intelligently in a manner which at first appeared so "Irish" to Service pilots that a certain mistrust of operating instructions soon became apparent! For who in his right mind, faced with rising oil temperature, could be persuaded then to close his radiator shutters?

But the reasoning behind the instructions was sound. The explanation was that without shutters, or with the shutters fully open, the oil round the periphery of the radiator became very viscous in cold air. This restricted the oil flow through the rest of the cooler with consequent overheating and a drop in oil pressure. The phenomenon

"There is little I can remember about [the Wellington IV] except for the atrocious noise it created. This was reduced somewhat by modifications to the airscrews."



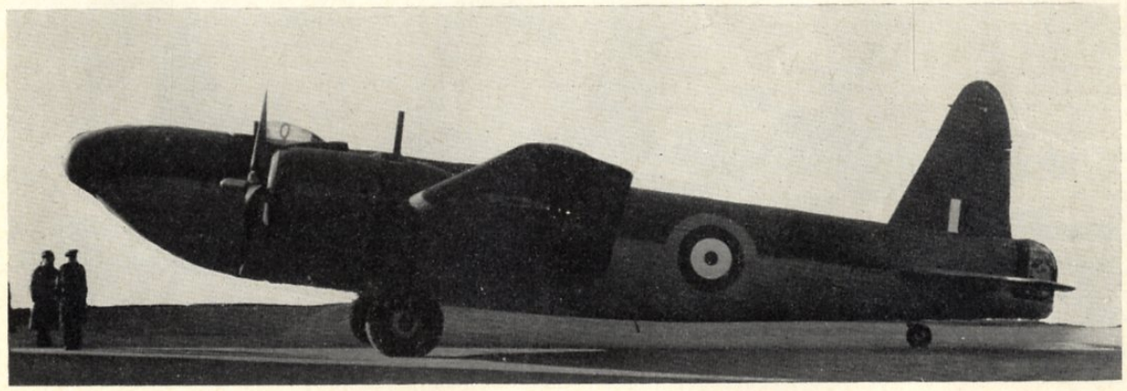
"Soon it was time to return to Squires Gate where P9238, the production prototype Wellington III, was ready for trials. This aircraft was fitted with Hercules III power packs which were later superseded by the Hercules XI."

was known as "oil coring". Blanking off the air flow by closing the shutters served to warm up the oil round the periphery of the cooler and allow a normal flow to be restored. Thereafter, the oil temperature could be kept within desirable limits by varying the setting of the shutters. Not every pilot could be convinced of this without a demonstration!

Mark X

From the successful Wellington III, the next stage in production became the Wellington X which looked very similar. There were, however, structural differences which included a "beefed-up" chassis and the adoption of a lighter but stronger alloy for use in the construction of the airframe. Together these two major modifications, plus the installation of the Hercules VI or XVI power pack, increased the auw to 36 500lb and improved performance generally. Eventually more Mark Xs than any other mark of Wellington were built, and this version was more efficient by far than its predecessors. The Mark X saw extensive use both at home and overseas. A few leading particulars of the Mark X were: Engines—two 1 675hp Bristol Hercules VI/XVI; empty weight 22 474lb; gross weight 36 500lb; max speed 255mph; range 1 885 miles at 180mph with 1 500lb bomb load.

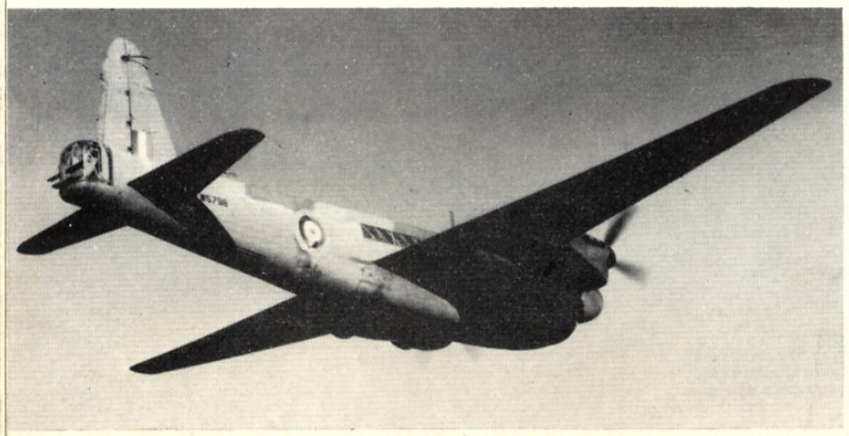
"The Mark V's pressure-cabin system was the basis of all pressurised systems used in the UK, including those of the Spitfire and Welkin."



Mark VI

Although the Wellington Mark V was powered by Hercules radial engines, production was soon switched to the Mark VI fitted with two Merlin 60 V12 engines and Rotol hydraulic airscrews but identical in most other respects to its predecessor. The Mark V's pressure-cabin system was the basis of all pressurised systems used in the UK, including those of the Spitfire and Welkin. In addition, drawings of the system were presented to the USA during the war.

Basically the aircraft was a standard Wellington fuselage mounting a cylindrical cabin forward of the front spar. Two Rotol blowers produced a pressure differential of 7½lb/sq in. At 30 000ft, 10 000ft conditions were obtained within the cabin. Entry was through a circular door aft, which was fitted with slots and dowels, and, in the centre, a wheel-operated valve. The pilot's head projected above the cabin into a double Perspex dome which could be opened partially against a check-wire, so giving an arc of view forward and to the port side. In emergency the dome



"Although the Wellington Mark V was powered by Hercules radial engines, production was soon switched to the Mark VI [photo] fitted with two Merlin 60 in-line engines and Rotol hydraulic airscrews but identical in most other respects to its predecessor."

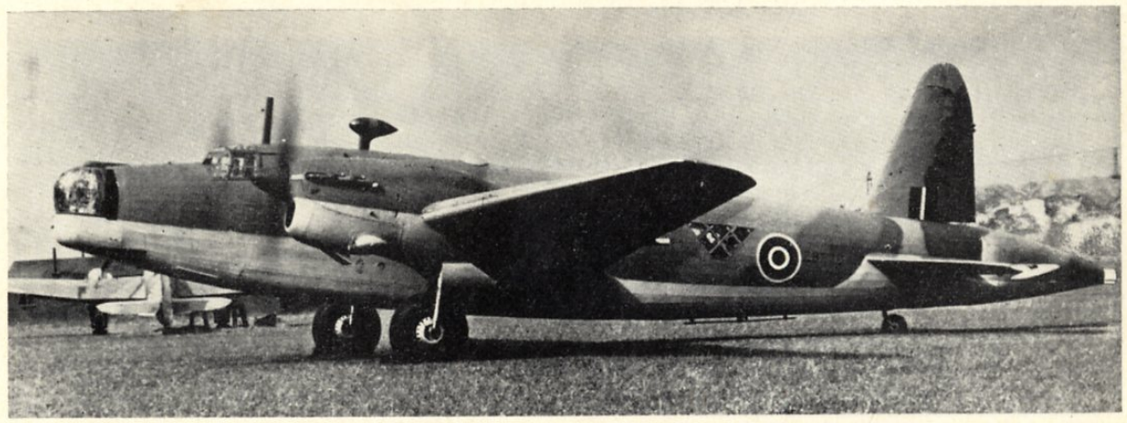
could be jettisoned and carried away in the slipstream. For a long time it was considered likely that this action would decapitate the pilot, damage the tail unit, or both. Eventually the late Rupert Bellville disproved this theory by rather thoughtlessly opening the clear-view section while diving at over 300mph, whereas it was designed for use only at approach speed in poor visibility. When the dome broke free, Rupert's eyes, unprotected by goggles, were subjected to quite a draught. Despite the severe pain, he pulled off a successful landing. Had he on this occasion been wearing the wide-brimmed Spanish bull-fighter's hat which he wore habitually when flying a Mark VI, he might well have been throttled by the strong cord under his chin.

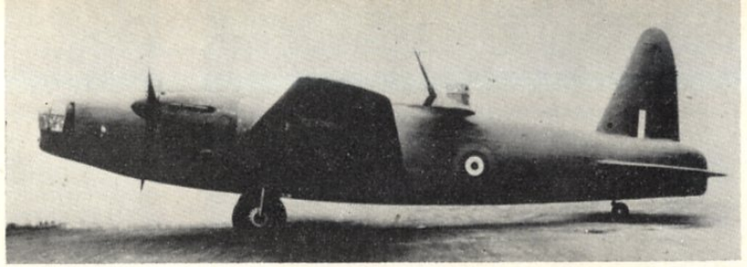
The layout of the cockpit was such as to add to the pilot's difficulties in an emergency, especially if the port engine had to be closed down, for this engine operated the pump which supplied hydraulic power. The hand pump was mounted on the port side of the pilot's seat, out of reach of other members of the crew. This position was unique to the Mark VI and resulted in a heavy work-load for the pilot whose hands had plenty to do otherwise when making a single-engine landing. The cabin temperature of around 30 deg C did nothing to help matters.

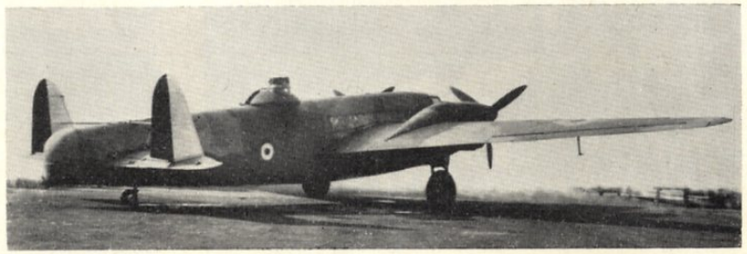
In the early days of the Mark VI this combination of circumstances occurred quite frequently, not through any fault in the Merlin engines, but because low air temperature at height caused the oil controlling the hydraulic airscrews to become too viscous. This led to surging of the rpm, and often a runaway of one or both propellers occurred. After a certain amount of trial and error suitable modifications were incorporated in the pitch operating gear and the rev fluctuation overcome.

Two serious problems remained which were never entirely eliminated—icing and a very unpleasant oil mist within the cabin. This oil mist was introduced into the cabin by the cabin blowers and severely restricted visibility therein. To avoid sickness the crew had to resort to portable oxygen sets. Invariably, as a climb continued, misting and eventually icing took place on the inner surface of the inner Perspex dome. A sandwich of hot air introduced between the inner and outer domes failed to prevent this, and at times one could see precious little within the cabin and

"... the W2B test bed Wimpey from which the rear turret was removed and replaced by a Whittle jet engine. This aircraft was a Mark II, Z8570, which I delivered to Rolls-Royce, Hucknall, in August 1942 with a fighter escort."







"...the 40mm cannon Wimpey. This aircraft, our old friend L4250...carried a 40mm cannon in the dorsal position. After unsatisfactory trials with a standard fin and rudder it was modified to incorporate twin fins and rudders."

nothing outside it until one scraped away patches of ice with a thumb nail.

Perhaps the most serious snag encountered was the stiffening up of the main aircraft control circuits at height, and this applied particularly to the ailerons. As time went on this was alleviated by changes in the control-rod guides and by the application of non-freezing grease to the circuits. At its worst the application of aileron was difficult and sometimes impossible at low temperatures.

The Mark VI flight which I remember best took place on June 18, 1942, in an aircraft whose wing tips had been extended by six feet. My crew was composed of G. R. Edwards (now Sir George) and R. C. Handasyde. Taking off lightly-laden at 24 058 lb and climbing on a straight course from Brooklands, we were in the neighbourhood of Chester when we reached our maximum height of 40 000ft. On the way home we met turbulence as we descended through a layer of broken cloud, and the flexing of the wings was quite a sight, making the Wimpey behave like an ornithopter! I believe that the height we reached may well have constituted a Class Record, had we been able to homologate and claim it. In time of war this was not possible.

Miscellaneous Wimpeys

Three unusual aircraft under the above heading come to mind, in each case a " one off " job:

Firstly, the W2B test bed Wimpey from which the rear turret was removed and replaced by a Whittle jet engine. This aircraft was a Mark II, Z8570, which I delivered to Rolls-Royce, Hucknall, in August 1942 with a fighter escort. The flight was quite straightforward, but to my great disappointment I was not allowed to ignite the jet *en route*. Rolls-Royce used the machine as a flying test bed, but with what results I never heard.

Secondly, the 40mm cannon Wimpey. This aircraft, our old friend L4250, previously mentioned, carried a 40mm cannon in the dorsal position. After unsatisfactory trials with a standard fin and rudder it was modified to incorporate twin fins and rudders. In spite of this the rudder response never seemed very positive to me, and I was glad that the flying programme was not a prolonged one.

Third and last, the " Dam Busting " Wellington. This aircraft had a modified bomb bay and carried major additions to the hydraulic system made necessary by its unusual bomb load. This consisted of four scaled-down versions of the " bouncing bomb " invented by Dr Barnes Wallis who flew with me on the first test flight. Each dummy bomb weighed 1 200lb and was rotated backwards within the bomb bay at 1 300rpm. Barnes Wallis expected that rotation of the bombs might set up a gyroscopic effect which would react in the yawing plane and so affect the steering. Because of this possibility, the bombs were spun-up singly until all four were rotating together at the required revs. Dives were made after each bomb was rotating, and these showed that there was no adverse effect on the aircraft's controls. I have always admired both Sir Barnes Wallis and Sir George Edwards for being so ready to participate in testing their own " babies ". Not all designers are so willing. This particular Wellington went on to carry out an exhaustive series of tests with the bomb at Chesil Bank and off Reculver in the hands of Mutt Summers and Shorty Longbottom. Full-scale trials were then conducted with a Lancaster.

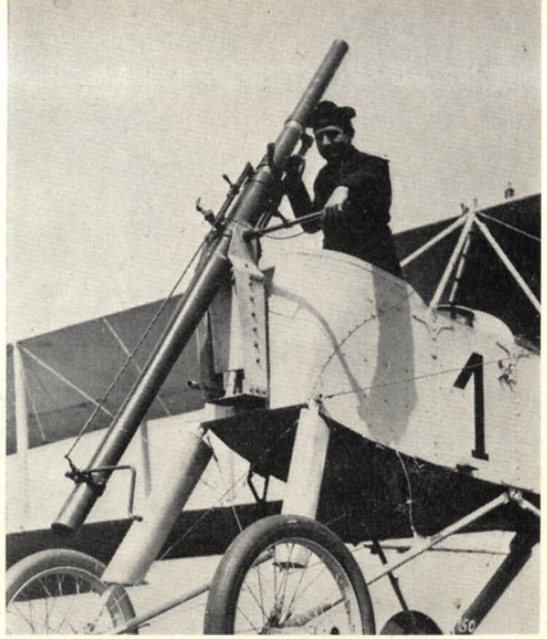
In all, twenty three versions of the Wellington flew, between them adding up to a total of 11 461 aircraft built. Of the many types I can remember having flown, only the Mark VI is recalled with anything but affection. I was not the only pilot who felt " cooped up " in it, and a bit of claustrophobia too.

Here and there

●A photo on the front page of a fairly recent issue of *Terbang*, a newspaper published by Malaysia-Singapore Airlines, featured a beautiful girl, modestly attired and standing in front of a Boeing 737 jetliner engine. The caption bore the headline "The Boeing Belle." The girl's name is Anna Low, a fashion model. But let *Terbang* tell the story: A girl coolly nonchalant in a see-through top. A jetcraft expressing power in each line and curve. Objects of admiration by themselves. But together they make a great team. Modern, elegant, bold and tough." Too bad we don't have room here to reproduce the photograph.

●The Stearman Alumnus Club has been formed to honour Lloyd C. Stearman and his contributions to aviation. Those contributions include such renowned aircraft as the Swallow, Travelair, the Lockheed Model 10 Electra and, of course, the series of Stearman trainers. Boeing's Wichita (Kansas) Division was formerly the Stearman Aircraft Company which began production of the Stearman trainers in 1934. A key function of the new club will be the exchange of Stearman memorabilia between its members. Those interested in membership should write to Stearman Alumnus Club, Stearman Aircraft Industries, Inc., Fifth Floor, 1133 Fifteenth Street, NW, Washington, DC 20005, USA.

12 pdr Davis gun mounted on the nose of a 130hp Canton-Unne Voisin pusher.



The Davis guns

MICHAEL H. GOODALL

IN 1868, the representatives of the major world powers met at St Petersburg in an attempt to eliminate the use of explosive or deliberately deformed bullets against individual soldiers in any future war. The result was a treaty which agreed that 450 grams should be the legal minimum weight of an explosive projectile. This agreement made it impossible for an explosive charge legally to be contained in any bullet of small dimensions.

The first automatic gun to fire a shell produced to the legally permitted minimum was the French Hotchkiss. This gun was very accurate and the shells had good penetration and considerable destructive effect. The shells were 37mm (1.44 inches) in diameter.

With the advent of the first successful military aircraft, just prior to World War 1, it was realised that a shell-firing gun would be a most useful weapon, both against ground targets and also against other aircraft, especially airships. However, under the terms of the St Petersburg Treaty, the only weapons which could legally be used were small calibre guns, firing a solid, non-explosive bullet, or else a shell-firing cannon of at least 37mm calibre. Experiments soon showed that the 37mm cannon was quite unsuitable for the flimsily-constructed aircraft of that era owing to the destructive effect of the recoil forces and the size and weight of the gun-mounting required. This meant that, in the first months of the Great War, the armament of aircraft was restricted to rifles and pistols, machine-guns, bombs or explosive darts. However, the fitting of armour plate to aircraft made it essential that larger guns should be developed, with sufficient muzzle velocity to pierce this armour and preferably firing a shell with an explosive charge which would cause massive structural damage to whatever part of the opposing aircraft was struck.

In addition, it was soon realised that the small bombs then available caused relatively little damage to buildings or ships etc, and that to be really effective the explosive charge ought to be contained in a projectile and fired at the target with considerable velocity so that it would penetrate the armoured deck of a ship or through the upper parts of buildings.

The first man effectively to tackle this problem of reconciling high muzzle velocity with low recoil force was Commander Cleland Davis of the US Navy. On August 22, 1911, he filed patent applications covering recoilless guns for use in aeroplanes and also electric primer ignition of the propellant charge.

The basic design consisted of a gun with two separate barrels joined together by an interrupted screw thread. The front barrel was rifled and chambered at the breech end to take the cartridge case and shell; the rear barrel was smooth and of uniform bore throughout its length. When unlocked, the rear barrel rotated in its mounting, slid to the rear and swung down to give unobstructed access to the front barrel for loading. The opening of the breech was thus controlled by a single handle and enabled the gunner to load and unload the shells single-handed with a minimum of effort. A rate of fire of 30 rounds per minute has been quoted for the 2-pounder gun, which sounds rather optimistic. Sighting was normally by simple ring and bead sight, although certain installations also incorporated a Hamilton sight.

In outward appearance the ammunition seemed quite normal, but internally it was unique in having the shell at the front end, the propellant charge in the middle and a quantity of lead-shot at the rear end. The weight of the lead-shot, which was bound together with vaseline or tallow, approximately equalled the weight of the shell.

The propellant charge was fired by an electric primer which was attached to a battery. Upon firing, the shell travelled up the front barrel whilst at the same time the charge of lead-shot travelled down the rear barrel, whence it quickly broke up and lost its velocity. The two opposing recoil forces neutralised each other and very little shock was transmitted to the gun mounting and the aircraft structure. When the Davis guns were fired they shot a sizeable sheet of flame out of their centre, so it was necessary to wear a cap with a thick canvas curtain attached as a protection against possible burns.

The Davis gun was developed during 1912 and 1913 and, in 1914, production was commenced at the General Ordnance Co, Groton, Conn, for the US Navy. The British Admiralty very soon became interested in the Davis gun as a potentially useful anti-Zeppelin weapon and also for attacking small naval vessels and particularly submarines.

The Admiralty Air Department ordered a small trial batch (one 2-pounder and ten 6-pounders) from the manufacturers early in 1915 and these had all been delivered by October 22, 1915. The guns were proof-tested at Woolwich Arsenal, after which they were issued to the Experimental Armament Depot on the Isle of Grain and also to the Marine Aircraft Establishment at Felixstowe. Here, many experimental mountings were made and the first known installation of a Davis gun in a British aircraft was the 6-pounder which was fitted to Short S81 No 126 on April 13, 1915, and test flown by Sqdn Commander Seddon.

Further deliveries of the 6-pounder version were received in August 1915 and experimental installations were made in a variety of naval aircraft. A total of 293 Davis guns was on order for the Admiralty on October 22, 1915. One example each of the 3 inch (12-pounder) and 5 inch guns were shipped to England on October 23, 1915 for trials by the Admiralty. No further mention of the 5 inch version has been found and it is assumed that it was realised that the great size of the gun and the weight of the shell would make it far too unwieldy for aircraft use.

On February 3, 1916, a committee of four RNAS officers and Harold Bolas of the Air Department met under the chairmanship of Wing Commander Clarke-Hall to examine the reports of the trials of the Davis guns and to make recommendations as to their suitability for use by the RNAS. It was decided that trials should continue and that a 2-pounder or 6-pounder should, if possible, be mounted on a 225hp Breguet pusher at Dunkirk for experience; also that Robey and Co should build a special gun-carrying machine to the designs of J. A. Peters. On April 5, 1916, the Admiralty ordered a further twenty 2-pounders, twenty-five 6-pounders and five 12-pounders.

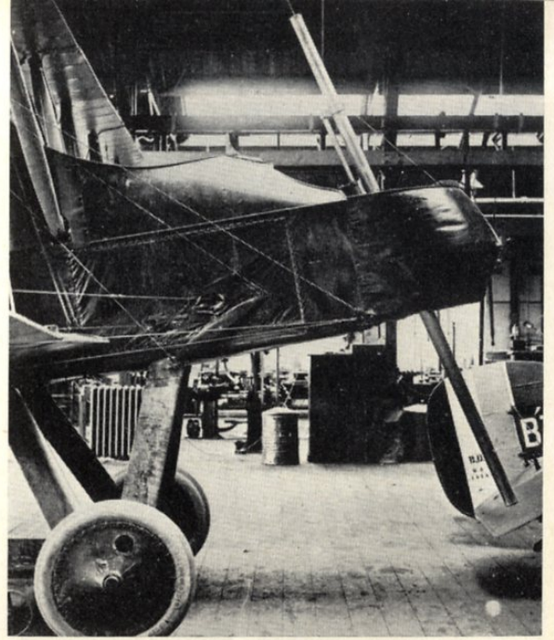
In addition to their aircraft use, the Admiralty had plans to fit Davis guns to armoured cars and motor-boats, and trials took place off Eastchurch with motor-boats, manned by RNAS crews, firing at floating targets. However, it would seem that after protracted trials, these proposals were eventually shelved. On test it was found that the muzzle velocity was approximately 1 200 feet per second and that the extreme range was 8 000 to 10 000 yards. The guns were extremely accurate up to ranges of 2 000 yards and the shells caused considerable damage on striking their target.

A prime example of the lack of co-operation at that time between the Admiralty Air Department and the Royal Flying Corps is shown in the case of the Davis guns. Although the Admiralty had been actively investigating and procuring these weapons since the end of 1914, it was only in October 1915 that General Henderson, GOC of the RFC in the Field, heard of them through the good offices of Dr Addison, MP, who gave him an introduction to the London agent of the General Ordnance Co. This gentleman replied to General Henderson's enquiry regretting that no guns could be delivered for the War Office before the middle of 1916 due to the priority being given to the Admiralty's order and suggesting that the War Office should approach the Admiralty to obtain supplies of at least trial quantities from them. By way of a sop, it was mentioned that the guns had been inspected by commissions from Italy, France, Russia and Spain, but they had also been told that the British Admiralty had priority.

It would seem that the War Office was able to come to an arrangement with the Admiralty as, on February 11, 1916, the RFC Machine Gun School at Hythe was asked to conduct the following tests with a 6-pounder gun:

(a) Firing mechanism and primers.
(b) Effect of incendiary ammunition.
(c) Value of tracer shells.
(d) Effect of high explosive shell on mild steel plates.
(e) Effect of rear charge on near objects.

The gun was mounted on the port side of a BE2c level with the front cockpit and was so arranged that it could fire ahead with either 45 degrees depression of 45 degrees elevation. Aluminium sheeting was attached to the fuselage near to the rear muzzle. Trials commenced at 11 am on February 16 and the target was an old BE2c, No 2078, at 300 yards range. Shots were fired from the beam and also from behind with the target aircraft tipped forward on to its nose to show the effect of an attack from below and astern. Sopwith and BE8 fuselages were also used as targets. The trials were considered to be successful and it was found that the gun was accurate and that a hit anywhere on the target aircraft caused sufficient damage to disable



6 pdr Davis gun mounted in an FE2H to fire vertically through the floor of what was normally the front gunner's cockpit. This installation was not used because the rear blast was too close to the pilot—who presumably fired it.

6 pdr Davis gun mounted on a BE2C at the RFC Machine-Gun School at Hythe.

12 pdr Davis gun mounted on an American naval flying boat together with a Lewis gun—the latter presumably for sighting. Gunner has pivoted breech of Davis gun to open position for loading.

it completely. However, the blast from either muzzle was found to smash ribs if within three feet of the axis of the gun. Although the rear charge of lead-shot soon broke up and had insufficient velocity to penetrate a sheet of paper 90 feet from the rear muzzle, it could still cause considerable damage to any part of the aircraft's structure which happened to be in its path.

Towards the end of February 1916, as a result of these trials, drawings of the 2-pounder, 6-pounder and 12-pounder Davis gun were sent to Vickers, Armstrong-Whitworth, Martinsyde, British and Colonial (Bristol), Avro and Aircraft Manufacturing Co (DH), who at that time were constructing fighting aeroplanes for the War Office, with a request that they should put forward proposals to mount one or other of these guns in their designs. On March 27, wooden mock-ups of the 2-pounder and 6-pounder versions were sent to the above firms as patterns pending the availability of the real thing.

The Martinsyde project covered the fitting of a 2-pounder on the top wing of its 120hp scout (the Martinsyde G100); 10 rounds of ammunition were to be carried. Martinsyde was also asked to design a barbette to carry a 2-pdr Davis above the top wing of its new experimental two-seater (presumably the F1).

The Armstrong-Whitworth design must have been the so-called FK12 triplane.

The Bristol design was undoubtedly the TTA or its projected derivative the F3A.

The Vickers design was probably the FB11.

The Avro design was probably the unidentified twin-engined fighter to Contract 87A/329 serialled A316/7, which was possibly a version of the Type 529 for the RFC.

The Aircraft Manufacturing Co's design must have been the DH3.

It seems unlikely that the above installations ever proceeded beyond the mock-up stage and eventually Lewis guns were fitted.

The first American installation of the 12-pounder Davis gun was on a Curtiss JN twin tractor biplane, where it was mounted in front of the cockpit. The trials were first carried out on August 2, 1917, at least a year after the RNAS had fitted this large gun in the nose of a Voisin de Canon at Dunkirk.

Further British experiments were also carried out in 1916 when it was found that the 12-pounder would fit perfectly in the roomy front gun position of the Dyott Battleplane. It was planned to fire the gun through a porthole on the beam. The aeroplane would then have moved round the target in a big circle while the gunner fired at it continuously. It was later planned to fit a 6-pounder Davis in the Dyott; the nose wheel would have been done away with and the gun mounted in the bows to fire in an arc vertically downwards to 35 degrees ahead.

However, by this time, it had been realised that incendiary and armour-piercing ammunition fired from the Lewis or Vickers machine guns was extremely effective against Zeppelins, and bombs had been used with some success against submarines. Therefore, while trials were continued and many different types of machines—both seaplanes and landplanes—were fitted experimentally with the Davis gun, only two operational installations have come to light, at least insofar as the British forces were concerned:

Early in 1917, the Admiralty decided that the Handley Page 0/100 should be fitted with a 6-pounder Davis gun for ground attack and anti-submarine operations and a special quadrupod mounting was designed and built at Battersea Experimental Workshops. The first example was completed in July 1917 and sent to Manston, where it was fitted to the nose of a Handley Page in front of the forward gunner's cockpit. Three further mountings were made in August and these were fitted to HPs Nos 1459, 1461 and 1462. Further 6-pounder guns and mountings, together with 500 rounds of ammunition, were sent to 7 and 7A Squadrons at Dunkirk in August and September and fitted to their 0/100s. In addition, two 2-pounder guns, together with traversing mountings and sights, were sent to Dunkirk and fitted to its DH4s. One Handley Page, No 3127, with a 6-pounder Davis gun and 50 rounds of ammunition, was sent to the RNAS Station at Redcar on September 7, 1917, for anti-submarine patrol duties.

During operational trials it was found that the blast from the rear muzzle damaged the top wings of the 0/100s and therefore both the gun-mountings and the top wings were modified locally before the guns were used operationally. It would seem that the guns were not a particular success and were used very little as, on December 3, 1917, Dunkirk advised the Air Department that no more 6-pounder ammunition was needed at present. On February 4, 1918, Dunkirk was asked to make a definite report as to the utility or otherwise of the 6-pounder in Handley Page's machines and thereafter the guns seem to have been withdrawn.

The RFC fitted a 2-pounder to the starboard side of an RE8, alongside the observer's cockpit and designed to fire forwards and downwards at about 45 degrees. This was used by 30 Squadron in Mesopotamia in 1918 for ground attack operations.

Trials by the RFC extended into 1918 before the Davis gun was finally shelved. In America, the 2-pounder, 6-pounder and 12-pounder were tried out during 1918, fitted in the nose of Curtiss F5L flying boats operated by the US Navy. A novel method of sighting the guns was used: a Lewis gun was fitted on top of the Davis and, as the target came within range, the gunner fired the Lewis and watched the stream of tracer bullets until he could see where they were hitting. He corrected his aim by watching the bullets strike, and when it seemed that he was dead on target the Davis gun was fired. This method proved extremely accurate and effective. Early in 1918, the American Naval Aircraft Factory designed and built a seaplane specially to carry a Davis gun. Designated the N1, this machine was a single-engined pusher biplane with the Davis mounted in the extreme nose and operated by the observer. In layout it was very similar to the 1915 Short S81 which had been the first British machine to carry this weapon. Two examples of the N1 were built. The first was completed on May 22, 1918, and made its first flight tests with the Davis installed on July 27, 1918. Very satisfactory results were obtained while shooting against targets moored in the Delaware River near to the Naval Aircraft Factory.

The end of the Great War seems to have put paid to further research in connection with this interesting weapon and it was to be nearly a quarter of a century before any further interest was shown in recoilless guns. During World War II most of the warring nations, but especially America and Germany, worked on projects concerned with recoilless artillery, but ultimately rockets were found to have greater potential.

Davis gun details

Type	*Bore*	*Length*	*Weight of gun*	*Weight of mounting*
2-pdr	1.575in	10ft	45lb	25lb
6-pdr	2.244in	10ft	168lb	40lb
12-pdr	3.000in	10ft	240lb	60lb
50-pdr	5.000in	—	640lb	—

Ammunition details

Type	*Total weight of cartridge*	*Weight of shell*	*Weight of lead-shot recoil charge*
2-pdr	7¼lb	2lb	2lb 2oz
6-pdr	15½lb	6lb	6lb 4oz
12-pdr	30lb	12lb	14lb 0½oz
50-pdr	126lb	50lb	—

The mixture for the recoil charge consisted of 25lb of 12 gauge lead shot (chilled) mixed with 0.63lb of vaseline.

British installations of Davis guns

The following actual or contemplated British installations of Davis guns have been discovered. There may well have been others:

Aircraft type	*Serial No*	*Position installed*
2-Pounder		
Norman-Thompson NT4	8338	In nose, above front cabin.
Blackburn Triplane	N502	In nose.
AD Scout or Sparrow	1452/3 1536/7	In nose.
Port Victoria PV2	N1	Above upper wing.
Supermarine Nighthawk	1388	Above upper wing.
Handley Page 0/100	—	—
Short 184	8364	—
Curtiss H12 Large America		In front gunner's cockpit.
Robey-Peters	9498	In each of the two gunners' cockpits.
DH4	—	Traversing mounting in rear cockpit.
RE8	—	Starboard side of rear cockpit.
Breguet de Chasse (225hp)		In nose.
Short 184	8076	—
BE2c	—	—
Vickers FB11	A4814	In gunner's cockpit above upper wing.
Martinsyde G100	—	Above upper wing.
AW FK12 triplane	7838	In each of the two gunner's cockpits.
6-Pounder		
BE12	6511	Starboard side of fuselage firing forwards and upwards at 45°.
Porte Baby FB2	9800	Forward of front gunner's cockpit,
Handley Page 0/100	—	Forward of front gunner's cockpit.
FE2h	—	Downwards through floor of front cockpit.
Short S81	126	Forward of front gunner's cockpit.
Short 310hp seaplane Type B	—	In rear cockpit.
FE2b	—	In front cockpit.
BE2c	4148	Starboard side of fuselage.
Dyott Battleplane	3688	Through bottom of front cockpit.
Short 184	8364	In rear cockpit.
Breguet de Chasse (225hp)		In nose.
BE2c	—	Port side of fuselage.
12-Pounder		
Voisin de Cannon (150hp Canton-Unne)	possibly 9154	Forward of front gunner's cockpit.
Dyott Battleplane	3687	Through porthole on port or starboard beam.
Felixstowe flying boat (F2A or F3)	—	In nose.
AD1000	1358	—

Stamps

PHILATICUS

THE history of aircraft in Australia is inextricably linked with the name of Sir Charles Kingsford Smith (1897-1935). He was perhaps the greatest of the many notable pioneers in Australian aviation. He served in World War I but was wounded and became a flying instructor. In 1919 he was giving joy-rides in England and preparing for an attempt to win the prize for the first England-Australia flight by an Australian. This was, in the event, won by Ross and Keith Smith. He became a stunt pilot for Hollywood, but in 1921 he was back in Australia engaged in joy-riding and air-taxi work.

In 1927, he flew around Australia with Keith Anderson and Charles Ulm. In 1928, Kingsford Smith and Ulm, together with an American navigator and radio operator, made the first trans-Pacific flight in the three-engined Fokker FVIIB-3M which they christened *Southern Cross* after one of the main constellations in Australian skies.

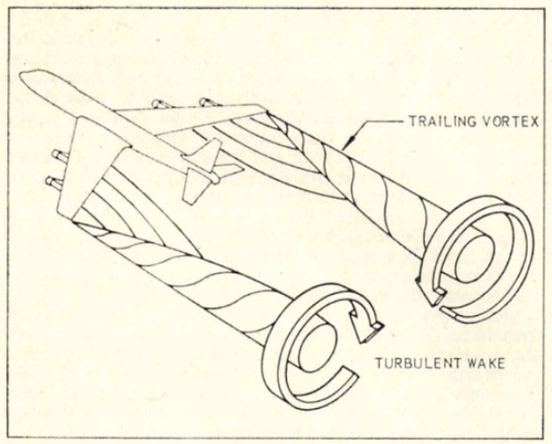
Further historic flights in and around Australia followed until Kingsford Smith was lost off the coast of Burma in November 1935 in an attempt to break the London-Melbourne record of 73 hours, set up by Scott and Black in their DH88 Comet in the 1934 air race. *Southern Cross* is preserved at the airport in Brisbane, the city where Smith was born, while there is a record of his journeys at the Kingsford Smith Airport in Sydney.

Our stamp is one of the three issued in 1931 to commemorate Kingsford Smith's world flights. It shows the *Southern Cross* above the two hemispheres. A further Australian stamp marking the 30th anniversary of the first Tasman flight—linking the Australian mainland with Tasmania—was issued in 1958. It shows Sir Charles Kingsford Smith and *Southern Cross*.

What happens to the air

In the wake of the superjet

JUST as a ship pushing through water leaves a wake, so does an aeroplane pushing through air. Although there are similarities between the two, there are more dissimilarities as a recent study has shown.



The study was prompted by the USA's Federal Aviation Administration which, in the absence of comprehensive aircraft wake information, had set stringent limits on how close aircraft could follow in the path of a Boeing 747 or Lockheed C-5A. These aircraft are so much larger than conventional aircraft that the FAA reasoned their wakes would cause much more air turbulence. Thus aircraft within the range of ground radar and trailing either of these big planes were instructed to stay a minimum of 10 miles behind them and at least 2 000 feet below them.

As a result of the Boeing studies and studies by the FAA and the National Aeronautics and Space Administration, that restriction has been lifted. Both the 747 and the C-5A have been placed in the same classification, so far as wake turbulence is concerned, as the 707-320, the Lockheed C-141, the BAC VC10, the Boeing B-52, the Ilyushin 62 and several versions of the McDonnell Douglas DC-8.

The wake left by an aircraft is in the form of a vortex—a whirlwind—one trailing from each wing. The port wing vortex is a clockwise rotating mass of air. The starboard wing vortex rotates counterclockwise.

Studies of an aircraft's wake and its effect on a following aeroplane began at Boeing in July 1969, and culminated in a series of flight tests ending in February of last year. In December 1969, a Boeing pilot flew an F-86 single-seat fighter behind a 747 with no difficulty. However, the F-86 pilot could not be sure he had thoroughly sampled the 747's wake since he could not see it. In subsequent tests, smoke generators were installed on outboard engines of a 747 and of a smaller 707-320B for wake comparison. Since the smoke followed the airflow of the vortices, the aircrafts' wakes could be seen and measured.

Then began a series of tests including the flying of NASA's Convair 990 and a Boeing 737 twinjet in the wakes of both the 747 and the 707. In one sequence a Boeing pilot flew a 737 in landing pattern behind the 747 at distances from 1.8 to 3 nautical miles. No significant turbulence was encountered further back that 2.5 nautical miles.

During the same period, the FAA and NASA also flew the Convair 990 behind a C-5A. Neither the Boeing nor the FAA-NASA tests indicated any significant differences in wake turbulence behind a 747, a C-5A and a 707-320B.

The tests also determined the path taken by a large aircraft's wake. It sinks behind the aeroplane at about 500 feet a minute and then levels off at some 800 feet (never more than 900 feet) below the aircraft's flight path. Thus by flying at or above the flight path of the plane ahead, a pilot of a following aircraft can avoid the wake.

Unlike a ship's wake in water, the wake of an aeroplane does not fan out behind the craft. The tests showed that when the aeroplane's wake is 50 feet and higher above the ground, the vortices never spread farther apart than three fourths the width of the aeroplane's wing span. In fact, within five miles behind the plane, the two vortices tend to come together and, since they are whirling in opposite directions, destroy each other. When the wake is within 50 feet of the ground, however, the vortices spread apart, in effect clearing the flight path for a following aeroplane. Ground crosswinds of up to five knots cause the vortices to stay within the flight path. Higher velocity crosswinds blow the wake across the flight path and quickly break it up.

Based on the information from these studies, the FAA has set new flight separation standards. A jet plane grossing 300 000 pounds or more may follow another jet as close as three miles and at a minimum altitude separation of 1 000 feet. A smaller aircraft following a heavy jet must stay back five miles, again with an altitude separation of 1 000 feet.

The sky is an ocean of air and its ships are aeroplanes. While you cannot see their wakes, you can feel them. Now they have been measured. Now they are known.

The US Army's Beechcraft RU-21D is

An unusual 'brown job'

Looking as though it has been stabbed all over with giant-size toothpicks, the Beech RU-21D is in fact fitted with an extensive antenna array and is employed on electronic reconnaissance missions in Vietnam. The US Army has also ordered 16 similarly-configured RU-21Es for delivery beginning next August. Both the D and E models are variants of the basic U-21A military utility transport and have Pratt & Whitney PT6A-20 turboprop engines.

Don Gentile climbs into the cockpit of a Mustang at Debden. Note whistle attached by cord to his "Mae West". [USAF

HARRY HOLMES tells the story of the American World War II fighter ace

Don Gentile

TO the pilots of the 4th Fighter Group, US 8th Air Force at Debden, Essex, Don Gentile fully deserved the nickname "Gentle", for on the ground he was a shy, quiet and slightly nervous type. However, as soon as he stepped into a cockpit he lost all of his insecurities and became extremely self-confident, with wonderful skill, judgement and reflexes—all of the many talents which go into the making of a superb fighter pilot.

This young pilot, Don Salvatore Gentile, was born on December 6, 1920, to Italian parents in Piqua, Ohio. His interest in aviation developed at an early age and much of his leisure time was spent at the local airport. By the time he was 17 Gentile had flown solo and was working as a waiter in order to save enough money to buy his own aeroplane. After losing $300 in a second-hand aircraft deal, Gentile's father bought him an Arrow Sport biplane and the teenager's flying abilities were soon clear to all.

When the war broke out in Europe, Gentile, who had just finished high school, tried to join the USAAF, but he was told that although he was no doubt a competent flyer he should go to college, get a degree and then enlist. But that would take two years or more and he just couldn't wait that long.

He drove over to Cleveland and sought out the RAF recruiting office. With the Battle of Britain being fought the RAF welcomed him, and during September 1940 he left home and headed for Canada to receive his basic training.

Early in 1942 Gentile arrived in England and was assigned to 71 "Eagle" Squadron. However, his entry into combat was not to be as, through his exceptional flying ability, he was given an instructing job. It was inevitable that he would soon get tired of this and he decided to get things moving one way or the other. One day, while piloting a Spitfire, he flew over a greyhound racing stadium whilst one of the races was in progress and he couldn't resist the temptation for a "beat-up". He roared across the track a number of times, sending dogs and spectators scattering for cover. In fact, the only thing not hiding was the mechanical hare. After landing, he was severely reprimanded and confined to quarters, but things worked out exactly as he had hoped because he was relieved of his instructor's duties and posted as an operational pilot to one of the other "Eagle" Squadrons, No 133.

His first mission with 133 Squadron was on June 22, 1942. He flew as wingman to Colby King and kept his eyes glued to his leader's wing for the entire trip and never even thought about firing his guns should the occasion have arisen. A number of uneventful missions followed until July 31, when Gentile's leader was shot down in a battle with Fw190s. For the first time in action he was alone and he soon had one of the *Luftwaffe* on his tail. Despite some desperate manoeuvres the '190 stayed behind, all the time closing up to get into a good firing position. In desperation Gentile rolled his Spitfire over on to its back and then into a spiral dive with the turns getting progressively tighter, causing him to black out. When he recovered he was alone once more with the enemy nowhere to be seen; his action seems to have proved too much for the German and he was able to set course for home without further incident.

On August 19, while flying cover for the Allied raid on Dieppe, Gentile flew three sorties and scored his first victories—an Fw190 and a Ju88, the latter just as it was making a bombing run at the troops on the beach.

In a ceremony at Debden on September 29, 1942, the Eagles were mustered into the 8th Air Force as the 4th Fighter Group. 133 Squadron became the 336th Fighter Squadron and the pilots changed their RAF uniforms for those of the USAAF.

Gentile's main aim in life was to shoot down five enemy aircraft and join the ranks of the aces. But it wasn't all that easy and the new group could only boast of two pilots with such a distinction—Gus Damond, a former Hollywood makeup man, who had nine, and Chesley Peterson, who had five. Gentile still only had his two from Dieppe; in fact, he didn't think much of his chances of more when the group was told that it would be trading in its Spitfires for the new Republic P-47 Thunderbolt. To the 4th went the dubious honour of giving the P-47 its baptism of fire, and the pilots voiced their comments on the seven-ton monster in no uncertain terms. The Group became operational with the P-47 on March 10, 1943, when Peterson led 14 Thunderbolts in an uneventful sweep along the French coast.

Over the next ten months Gentile added another six enemy aircraft to his score, and he and Duane Beeson tied for top place in the group at that time with eight apiece.

On January 14, 1944, the entire group took off for a mission in the Paris area led by their new CO, Col Don Blakeslee. Under Blakeslee the 4th was destined to blossom into the top fighter unit of the 8th Air Force, with the number of enemy aircraft destroyed even surpassing Col Hubert Zemke's famed "Wolfpack", the 56th Fighter Group. January 14 was to be the beginning of this surge, four fantastic months in which time the 4th was to break all group records for enemy kills.

For Don Gentile that day had a private meaning. It was the day he almost died. It was a day he made himself a promise he never broke, a promise that was to push him to the fore in American fighter aces.

The mission started off well with Gentile leading a "four finger" flight section. His P-47 sped along sweetly and the skies were clear. It was a piece of cake; just another piece of cake.

The flight broke through cloud about 20 miles north of Paris and Gentile's sharp eyes spotted an aircraft far below. "Bandit at 9 o'clock low. See it?" A series of grunts and "nopes" filled his earphones. "I'm sure it's a loner" he insisted. "Keep formation while I pick me up a quickie." He peeled off and sent the Thunderbolt scorching down to 10,000 feet where he pulled out right on to the tail of the unsuspecting enemy aircraft, an Fw190.

Gentile pressed the gun button and immediately smoke began to pour from the 190's engine. Another burst and large chunks flew off the wings and cowling. The Focke-Wulf started to burn and suddenly exploded, spraying the P-47 with flaming fuel and large pieces of metal. His Thunderbolt rode through the blast and now he seemed to feel the sensation that the control's weren't responding to his touch. A soft boom-boom-boom sound and then a frantic voice over the radio shouting, "Break, Gentile, break. Break you lummox".

Instinctively Gentile broke, but too late. A cannon shell ripped past him, smashing his gyro, and great lumps of metal tore from the wings. A cold sweat broke out on his forehead, for now he was being hunted. There were two Fw-190s on his tail, knocking lumps off his P-47, and nothing he tried worked out right. He just couldn't break free. Blakeslee had stressed to his pilots the importance of sticking to the higher altitudes for combat, because low down an Fw190 could out-turn a P-47 every time.

Gentile jammed the stick forward, putting the Thunderbolt into a steep dive. The Focke-Wulfs followed, sending a few more bursts at the P-47, but Gentile kept barreling on down. Then, after some violent manoeuvres, he saw that one of the Germans had disappeared, although it wasn't much consolation as the leader was still close behind. Now, stick right back and hard left rudder! Then the opposite! These weren't even thoughts. It was all instinct, but the German was a superlative pilot and he certainly wasn't going to give up his chance of destroying the P-47.

The two fighters were now right down to about 50 feet with the 190 getting in some good bursts. The German began to close the gap and Gentile was beginning to resign himself to the idea of getting shot down. Suddenly the Focke-Wulf peeled off and headed for home, apparently short of fuel or ammunition.

What a lucky escape! And that is when Gentile made himself the promise. Never again would he go down on a 'bounce' alone, even though most of the aces were getting their kills that way. From now on it was going to be Gentile and his wingman together.

After some thought, Gentile picked John T. Godfrey for his wingman and so began the partnership which was to earn them the name of "The Damon and Pythias of the 20th Century" from Winston Churchill and, most important of all, become the team which perfected the wingman concept of air fighting: if one attacks while the other protects, they can both survive.

Gentile remembered Godfrey from four months previously when he acted as his wingman for one mission. On the return journey Gentile had caught a touch of vertigo going through clouds and had spun out. Godfrey, thinking it was some super ace's manoeuvre, had stuck with him all the way down to 1 500ft when Gentile regained control. After landing Gentile had congratulated him on his flying ability but he had just shrugged his shoulders and walked away a little disgusted.

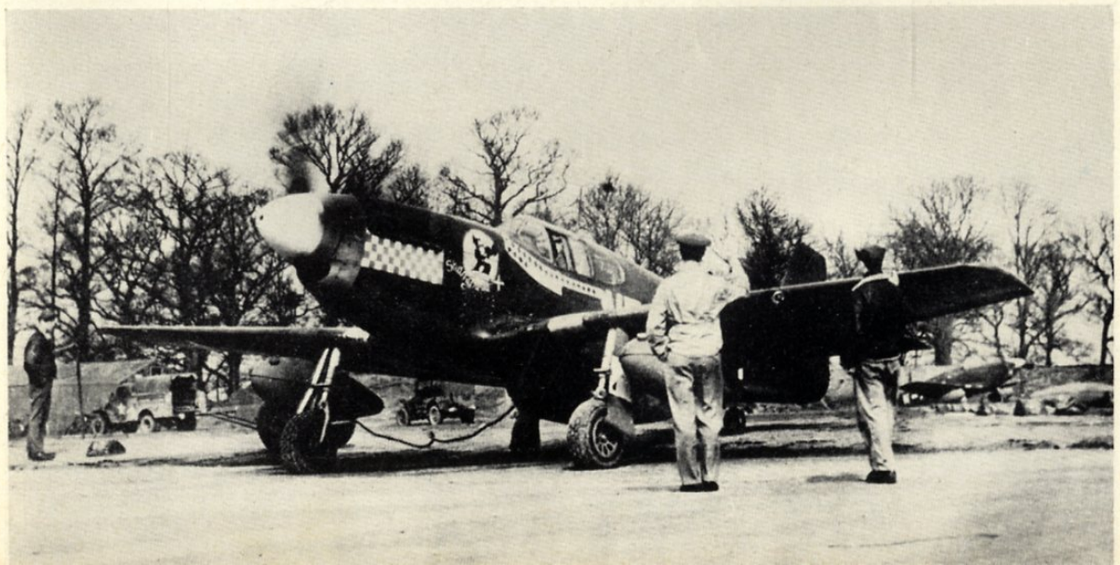
In February 1944 the arrival of the 4th's brand new P-51B Mustangs was greeted with great excitement at Debden. The P-51 was more like the Spitfire, which many of the pilots had known and loved, and so they weren't sorry to see their Thunderbolts go.

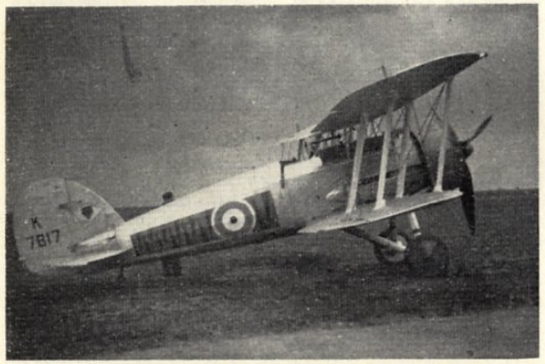
The first real test of the Gentile-Godfrey partnership came on March 3, 1944, when the group attempted to escort bombers to Berlin, but the weather really deteriorated *en route* and nine of the P-51s got lost, including Gentile and Godfrey. The nine Mustangs were bounced by a number of Bf109s and Fw190s and in the short, fierce dogfight that followed Gentile destroyed two while Godfrey got one. Godfrey could have had another but had to cover Gentile's tail at a bad moment.

On March 4, on the first completely escorted raid to Berlin,

[*continued on page 190*

Shangri La, Gentile's P-51B-5-NA 43-6913 VF-T warms up in the 336th Fighter Squadron's dispersal area at Debden in April 1944. [USAF





PHOTOFILE

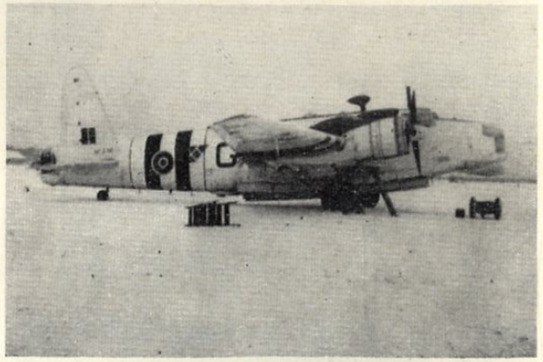
ABOVE: A Buccaneer S2 of 809 Sqn is catapulted from HMS *Ark Royal* while one of the carrier's Wessex 1s hovers alongside the vessel on "planeguard". [Michael Turner

LEFT: Gloster Gauntlet K7817 sporting the yellow and black markings of 74 Sqn—The *Tigers*. [T. McKinlay

BELOW: The famous F-100D-65-NA 63000 'Triple Zilch' of the 55th TFS/20th TFW visiting RAF Wattisham in September 1957. [B. A. Forward

ABOVE: Pre-war shot of an early production Hurricane I (L1621) with Wellesley K7732 in the background. [*via* J. C. Sweeney

RIGHT: Wellington XIV HF336 photographed in June 1945 when it was based at Ford for experimental photography at night. [J. N. Birch



BELOW: Lockheed L-188C Electra SE-FGA of the now defunct Swedish airline Falconair. [Aviation Photo News

LEFT: Gentile has a word with his crew chief, John Ferra, under the nose of *Shangri La*. [USAF

BELOW LEFT: Gentile and Johnny Godfrey, with their crew chiefs and Godfrey's dog, Lucky, pose for the photographer on the wing of *Shangri La*. [Courtesy Mrs Joan Godfrey

DON GENTILE

[*concluded from page 187*

Godfrey was able to destroy one while Gentile covered. And so it continued. Gentile ended March with a total of 21 victories while Godfrey had 14. The team was working perfectly, with the lead aircraft changing to give each the chance of a victory.

Don Gentile's aircraft was named *Shangri La*, while Godfrey's was *Reggies Reply*, and in order to recognise each other in the heat of battle they had red and white checks painted on lower part of their engine cowlings just below the exhausts.

On April 1 Gentile scored another victory, but doubted how good his teamwork now was because it seemed to be costing him the top spot in the 8th Air Force. Duane Beeson was up to 25 victories.

The mission of April 5 was to put him in no doubt at all. It was a sweep of the Berlin district, and before take-off Gentile kidded Beeson that he would overtake him in the victory list. The whole operation turned out to be a great success for the 'Terrible Twins'. Gentile destroyed five Bf109s while Godfrey bagged a Ju88 and a Bf110 and shared an Me410. But Gentile regretted the joke he had with Beeson because the latter did not return. However, he was relieved slightly to hear, later, that Beeson had baled out successfully and been captured.

Gentile's five kills had put him over the top. His score was now 27 and he was the first fighter pilot in the 8th Air Force to pass Rickenbacker's legendary 26 kills of World War I.

However, for the mission of April 8 he was still feeling the loss of Beeson and wondered just how long he could survive. He warmed his engine badly, feeding it too much fuel, and things really seemed to be against him when Godfrey had to abort due to engine trouble. Gentile felt alone, even though the rest of the group was all around.

As the group flew on he began to wonder what would happen if combat came and he hadn't the reliable Godfrey to depend upon to cover him. He found out soon enough, as the 4th got entangled with over 50 German fighters. In the ensuing battle instinct took over and Gentile destroyed three Bf109s in quick succession.

With 30 victories Gentile was now the "Ace of Aces" and the newsreel and newspaper cameramen flocked to Debden to get their shots of the hero. He agreed to all their proposals for photographs, but it would have to be after he returned from the next mission. That was far more important to him as it was to be his last before returning to the USA on a bond-selling tour. The photographers decided to wait for him at dispersal on his return.

Near Schweinfurt the 4th encountered a number of Fw190s, one of which Gentile lined up for the kill and began getting in some good bursts. However, he noticed a P-51 being heavily attacked by 190s and broke off his own attack in order to help the other Mustang.

On the return to Debden, Gentile saw the cameras all set up waiting his arrival and decided to give them some good shots by beating up the field. Unfortunately he had not circled enough to regain his depth perception and *Shangri La* struck the grass about 100 yards in front of the crowd. The aircraft bounced once and then slid along the ground before coming to rest with its back broken.

Gentile's proposed bond tour of the United States couldn't come quick enough for him, if only to escape the wrath of Colonel Blakeslee who had a standing rule that anyone who damaged an aircraft during a beat-up was automatically transferred from the 4th, no matter how good he was. The Air Force decided to send Godfrey along to stress the need for teamwork, but he was back in action with the 4th just over three months later because things in the 'States were too quiet. He went on to become the Number Two ace in the 8th Air Force and finish the war with 36 victories, but that's another story.

Don Gentile remained in the USA and became a test pilot at Wright-Patterson field for the remainder of the war. Later he continued test flying and also found time to take a degree at the University of Maryland. On January 28, 1951, he was on a routine training flight in a Lockheed T-33 when, shortly after take-off, the aircraft suffered a flame-out and crashed into a heavily wooded area, killing him. It was ironic that Don Gentile, who survived nearly 200 combat missions and was one of America's greatest fighter pilots, should die on a peacetime training flight.

Seven from Kenya

An assortment of civil aircraft photographed last January at Wilson Field, Nairobi, by STEVE HARMAN.

1 Cessna 182M 5Y-AKH (c/n 59905) of Kenya Air Charters Ltd.

2 Aero Commander 100 5Y-AEF (c/n 064) with cat insignia and legend "Travel in comfort" on tail.

3 C-47B 5Y-AKB (c/n 32922) of the Kenya Police Air Wing.

4 Piper Pawnee 5Y-KSD (c/n 25-2070) of Airspray (East Africa) Ltd.

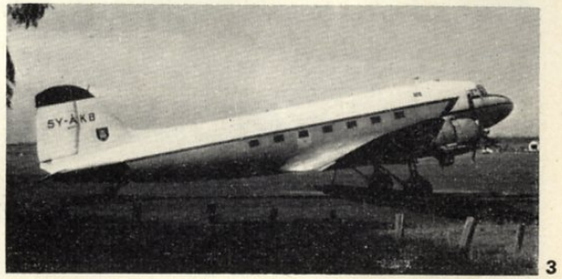
5 Piper Super Cub 5Y-ACE (c/n 18-8301) of the Kenya Game Dept.

6 Transavia PL-12 Airtruk 5Y-ALS.

7 Piper Super Cruiser 5Y-KGK (c/n 12-2312) of The Missionary Aviation Fellowship.

1

2



3

4

5

6

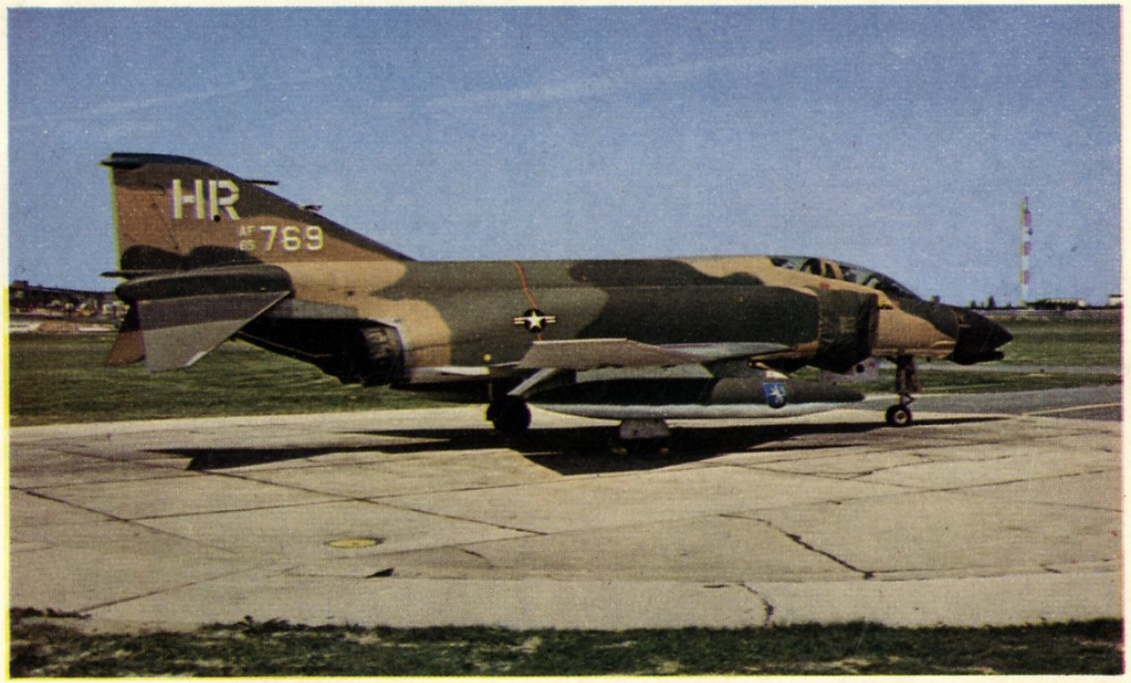
7

Purposeful Phantom

ABOVE: McDonnell Douglas RF-4E 97448/3861, one of 88 Phantoms which are to re-equip two of the *Luftwaffe's* reconnaissance wings.

RIGHT: FG1s (XV582 nearest camera) of 43 Sqn, RAF.

BELOW: F-4D 50769 of the 10th TFS, 50th TFW, USAF, at Spangdahlem, Germany. [Aviation Photo News



Fire bombs

A brief account of the advent of the napalm bomb

J. D. OUGHTON

DURING fighter and fighter-bomber operations over North-West Europe in the period around the *Overlord* invasion, there was a build-up of reports from pilots and others of jettisoned drop-tanks bursting into flames when striking the ground. Fire had long been accepted as a major anti-personnel weapon, and, to determine the possibility of using the standard drop-tanks filled with a highly inflammable substance as a ground attack weapon, tests were put in hand with full and partially-filled tanks using various grades of fuel oil. The results were inconclusive—primarily because the liquid gave a flash fire of limited duration and dispersion area. Further investigations were begun into the possibility of developing a more suitable inflammable filling.

While this investigation was proceeding, a series of trials—using Mustang and Typhoon aircraft—was initiated within the Royal Air Force; the trials were designed to evaluate feasibility and tactics, and the Air Fighting Development Unit (AFDU), based at RAF Wittering and commanded by Wg Cdr W. F. Blackadder, with Sqn Ldr T. S. Wade as OC flying, was instructed to proceed with these exploratory tests by Ops1/Tactics of Air Defence of Great Britain (ADGB) on September 8, 1944.

AFDU was asked to determine the ground dispersion area for each type of drop-tank, the best methods of approach and release, to see if the standard drop-tank release mechanisms were suitable, and to advise on whether this form of weapon could be delivered operationally without undue hazard to the participating aircraft.

Throughout the trials the standard tanks for the Typhoon IB and the Mustang III—45 and 62.5 Imp gallons respectively—were used and, working on the basic information available, that the intended naphthalene incendiary mixture had a similar specific gravity to 100 octane fuel, the tanks were filled with 32 and 47 Imp gallons of water respectively. A colouring agent was added to the water to better define the dispersion areas. The operational bomb would, it was known, be detonated by a white phosphorus grenade, but this was not incorporated in the first series of trials.

The actual aircraft used in the tests were Hawker Typhoon IB MN974, and North American Mustang III FZ107.

Although all the tanks dropped were standard, the rack fairings on the Typhoon between the wing and the tank were removed—and this was recommended for all operational use, permitting as it did a much cleaner drop-off. There were no modifications necessary to the Mustang racks or tanks.

Initial tests quickly brought out a deficiency in the Typhoon system of tank release whereupon AFDU designed a new arrangement with the release control on the left side of the cockpit so that the pilot would not have to ' change hands ' to release the tank or bomb.

The first trial was flown with the Typhoon on September 25, 1944: the two 45-gallon tanks were dropped over the range from a height of 80ft and at a speed of 330mph ASI. Two days later, the Typhoon made a second recorded run over the target, this time releasing the tanks at 2 000 feet at a speed of 350mph ASI in a 30 degrees dive. Trial No 3 was flown on September 28, by the Mustang, which released the tanks at 80ft and a speed of 300mph ASI; the fourth and final recorded trial run was also carried out by the Mustang—again at 80ft but this time at a speed of 400mph ASI. In addition to these recorded runs, where a chase aircraft formated closely with the pilot taking cine-film of

LEFT: NA Mustang III FZ107 which was used in the AFDU/AFDS fire bomb trials.

RIGHT: Film strip of trial No 4, on September 29, 1944, showing the Mustang releasing two simulated fire bombs—75 US gal drop tanks filled with 47 gal water—from 80ft at 400mph ASI.

the runs, other trials were conducted at speeds up to 425mph and in dives up to 45 degrees.

Results showed that reasonable accuracy could only be obtained in a low-level attack, ie below 500ft, for above this height the effect of wind and the tumble of the drop-tanks made accurate placing impossible. The ground dispersion area achieved with the Typhoon tanks was pear-shaped and measured approximately 180 by 90ft, while the Mustang—with the larger tanks—covered a more elliptical area some 225 by 75ft.

The tactics recommended by AFDU began with an approach about five miles upwind of the target at a height of about 7 000ft, from which the aircraft was dived at about 30 degrees to a height of 100ft, some 1 800ft from the target. From this point a straight and level approach was made at 380mph and the tanks released as the target disappeared from view under the nose of the aircraft. An accuracy of 75-90ft was achieved using this method of approach.

The results of these preliminary tests using water-filled ' dead ' bombs were studied carefully while the definitive mixture for fillings was in preparation. Then, on October 21, 1944, an instruction was received by AFDU to proceed with full trials using armed tanks, or bombs.

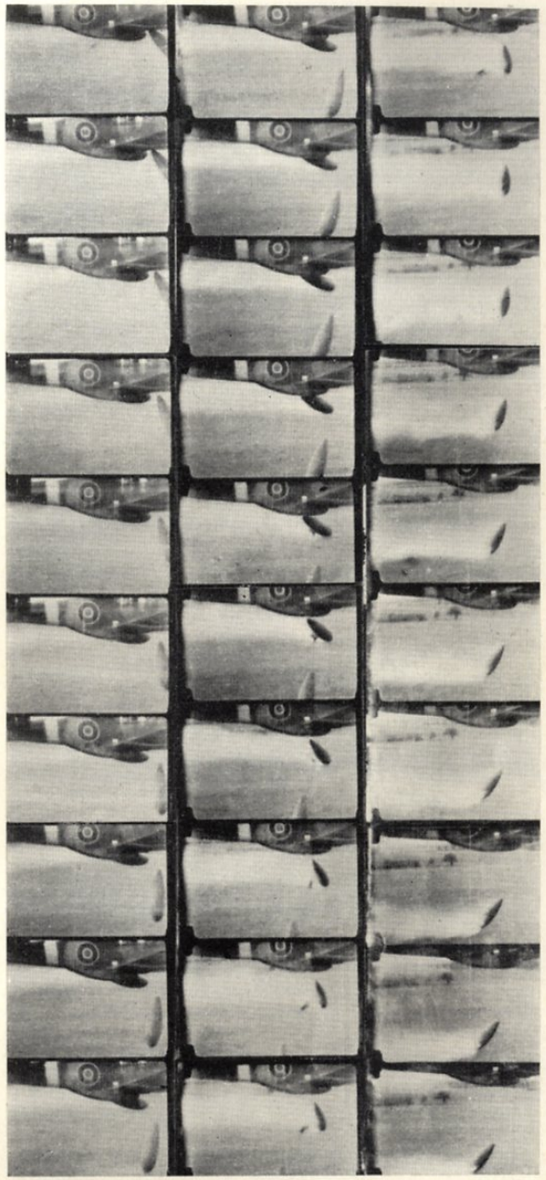
Significantly this signal came from Ops1/Tactics, Fighter Command, which had been reconstituted as such from ADGB on October 15, 1944. AFDU, too, had been changed—it was now the Air Fighting Development Squadron (AFDS), still at Wittering and commanded by Wg Cdr Blackadder, but now part of the Central Fighter Establishment (CFE) under the command of Air Cdre R. L. R. Atcherley. The trials were again carried out using Typhoon and Mustang III aircraft.

The ' live ' bombs comprised standard-to-type drop tanks as previously described, filled with two different types of incendiary mixture—Perspex in benzole, and aluminium laurate and creosole in ' pool ' petrol. Both were impact ignited by a white phosphorus grenade strapped to the side of each tank, with the safety pins wire-linked to the aircraft racks.

The tanks/bombs were filled in position on the aircraft from 40-gallon drums, pressurised *via* a feed from a small compressor. This part of the operation had to be carried out with great care for, apart from the fire hazard, the mixture or ' gel ' hardened very quickly when exposed to the air. The filler tubes, etc, were reckoned to be useable, even with extreme care, for about 10 fills. The time taken to fill a Typhoon tank was seven minutes, and, for the larger Mustang tank, about 10 minutes. A Type 80 white phosphorus grenade was then affixed to each tank and the pins secured to the wing racks with copper wire.

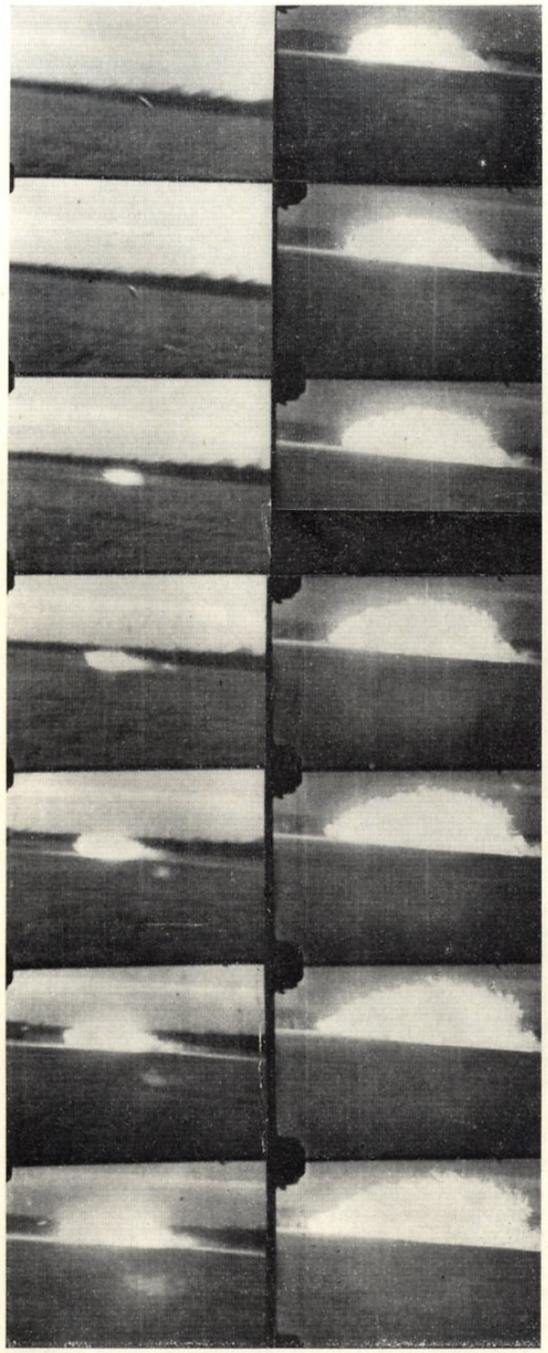
The first flying trials were carried out over the mud flats of the Holbeach ranges, and bombs of each filling type were dropped from both aircraft. The air observers reported that the tests showed that the Perspex in benzole bombs gave off a large sheet of flame and dense clouds of black smoke. The flames burned fiercely for two or three minutes and then reduced to a scatter of small fires. The aluminium laurate bombs gave out a larger burst of flame, but this died away much more quickly.

However, there were limitations to the Holbeach mud flats, for the results could only be observed from the air. It was therefore decided to run more tests at a location



where ground observers could take part, and eventually a target area was set out at RAF Collyweston. This comprised three slit trenches and a gun emplacement, all roofed over, plus an open slit trench, in each of which was placed a straw dummy figure. The trials at Collyweston were flown only by the Mustang.

During this second phase of the ' live ' tests, it quickly became apparent that the air observers had had an exaggerated impression of the magnitude of the fires caused by the bombs. The ground observation party, who were in positions 450ft from the dropping zone, reported that once the shock of the initial fire burst was over, they were able to



Effect of a fire bomb dropped by a Mustang III flying at 80ft at 400mph ASI, Collyweston, winter 1 944-45.

walk through the scattered fires in the target area within 45 seconds of the drop. Also, despite the entire target area being completely covered within the dispersion area of one bomb, the ' gel ' did not penetrate into the slit trenches and only a small amount—not sufficient to ignite the straw dummy—was thrown into the gun pit. However, the surrounding surface terrain was severely burned.

At Holbeach, the drops were made from a slight dive at a height of some 500ft at speeds up to 300mph, and at Collyweston the release height was 50ft, at an indicated speed of 340mph.

Final recommendations were that the approach under operational conditions should be made at 5 000 to 8 000ft according to cloud conditions, then a turn made through 90 degrees on sighting the target, a descent made to an altitude of 1 500ft about 1 500 yards from the target area, and the attack then carried out from a shallow dive at the maximum permissible speed. This was set for the Mustang and similar aircraft at 350mph, for the higher speeds were now thought dangerous due to the possibility of the tanks not falling clear and fouling the airframe. The attack in the final stages should be closed to a minimum altitude of 50ft, with full use being made of the forward firing gun armament of the aircraft.

AFDS estimated that the attacks could be carried through in this manner with no extra hazard to the aircraft or pilot than was inherent in any other ground attack operation. The ground dispersion area achieved by the Mustang was about 150 by 90ft, and the Typhoon some 120ft square.

These results were passed to Fighter Command by CFE in a report dated January 17, 1945, and events moved swiftly after this, for under the name which was to become notorious —' Napalm ' (from the standardised filling wherein naphthalenic and palmitic acids were used to form petrol into a ' gel ')—these bombs went into use with the Allied forces in Europe and the Far East in the early months of 1945.

The first British use of napalm bombs—then described as ' liquid fire bombs '—appears to have taken place in Burma on February 15, 1945, when RAF and USAAF fighter-bombers, working from a ' cab-rank ', attacked Japanese forces along the Irrawaddy south of Pakokku, after the British 4th Corps under Lt Gen Messervy, *en route* to Meiktila, had forced a bridgehead across the river. The bombs made a fearful impact on the Japanese, and also a great impression upon the Allied troops—so much so that an official signal commented upon the tendency to " . . . watch the exhibition, rather than get on with the attack." The aircraft used were Mustangs of the USAAF, and RAF Thunderbolts of 221 Group.

In the European theatre of operations, the bombs came into use in April and May, 1945. On April 9, Spitfires of 324 Wing, Desert Air Force, are known to have attacked German positions along the West bank of the river Senlo in Northern Italy, in support of the advancing 8th Army. On April 11, Mustangs of 249 Sqn RAF dropped napalm bombs on parked enemy motor transport near Zenica in Yugoslavia. The following day 324 Wing was again in action with the bombs, and on April 13, 249 Sqn made another raid, but this time its bombs fell short and landed in the Danube.

About this time the American 8th Army Air Force made an attack on the German troops holding out below Bordeaux at the mouth of the Gironde, and dropped, to quote the words used at the time " . . . a novel form of incendiary, called ' liquid fire ', which left the area a sea of flames."

Bomber Command, in the shape of 100 (Bomber Support) Group, began a series of napalm raids in April 1945, against targets in Germany. Given the code name *Firebash*, these raids were carried out with Mosquito aircraft, each carrying two 100-gallon bombs. The first of these attacks seems to be that carried out on Munich-Neubiberg airfield by 141

RAF Comets have world-wide role

Spotlight on the work of 216 Squadron

THE gleaming silver-winged Comets of 216 Squadron of Air Support Command at RAF Lyneham, Wilts, have flown many millions of miles in an efficient demonstration of their ability to combine routine service duties with their secondary, but headline catching, role as luxury VIP transports.

The five Comet 4Cs in service with the squadron are first and foremost hardworking aircraft forming an integral part of Air Support Command's world ranging transport fleet. They would play a part in the event of a major international military air-lift, while their routine duties include aeromedical evacuation and a regular service of trooping flights to and from this country.

Despite its functional role, however, the Comet squadron often finds itself in the news with its VIP and other special duties, and the visitor's books of the squadron aircraft are like pages torn from a scrapbook of contemporary history. Page by page, the leather-bound books record the names of kings and queens, princes and presidents, heads of state and leaders of the Armed Forces who have been carried in red-carpeted dignity by the squadron.

Last entry of all in one of the books is the name of the Arab girl who turned the eyes of the world on to 216 Squadron one day last September. Miss Leila Khaled, failed air hijacker, penned her name in mid-air on September 30, 1970, with her address as Haifa, Palestine, while a Comet whisked her to Egypt after her uninvited stay in Britain. Ironically, the same book in which her name appears contains also the royal signature of King Hussein of Jordan—and of Arab leaders whose entries bear the bleak addendum "since assassinated".

The names of our own Royal Family crop up in the visitor's books with surprising regularity and the only names missing are those of the youngest of the royal children.

Rightly, 216 Squadron regards the books as priceless and the squadron adjutant, Flying Officer Sylvia Ingold, watchfully ensures that apart from their flying trips they remain under lock and key in the RAF Lyneham headquarters. Even so, one visitor with a thick wallet offered five thousand dollars for just one page and was disappointed when his bid was rejected. The one sheet which attracted such an offer contained the signatures of three queens and two princesses: the Queen, the Queen Mother, Queen Frederika of Greece, Princess Sophie of Greece and Princess Margaret.

A cupboard crammed with colourful bunting turns out to be the squadron's stock of national flags for use on overseas visits. There are 33 of them, including the Royal Standard and the personal colours of Prince Philip and the Chief of the Defence Staff. The elegantly appointed Comet 4Cs have literally shown the flag in countries right round the world. Wing Commander B. D'Oliveira, who commands 216, selected one month—November—at random to illustrate the flights with which the squadron is typically tasked. A tour of the USA with the College of Air Warfare, a world trip with the Vice Chief of the Air Staff, regular trooping to Germany and visits to Malta, the Caribbean, Guam and Hong Kong were among the flights listed.

When a Comet of the squadron fleet flies in the VIP role it is fitted with a removable 'mini hotel' layout which includes divan beds, wardrobe units and a separate sitting/dining room; the service is of matching standard. Even in this special role, however, the Comets are put to maximum use for the remainder of the cabin space is fitted with conventional seating and surplus accommodation is usually made available for passengers through the Ministry of Defence bookings network. The VIP embellishments can be shed easily and today's VIP flight may well be tomorrow's trooper with anything up to 86 soldiers aboard.

Although 216 Squadron has been flying Comets since 1956 it recently went through upheaval on the engineering side when the 'production line' approach to maintaining the Comet and Britannias fleet was dropped with the Britannias' departure to Brize Norton, and 216 was given, almost overnight, the whole vastly complex task of keeping its aircraft in the air.

Heading this new-look squadron has been Squadron Leader Bob Reid, under whose care the Comet's flying time and availability has shown a steady upward movement on the charts. The credit for this achievement, he maintains, belongs to the flight of nearly 100 men who work on the airframes, engines, electronics, radio/radar and stores for the squadron. Especially praiseworthy, he says, is the way the team members work to finish each job in hand regardless of the clock. For them all, the prime aim is to keep each of the Comets ready to fly, and since last July not one aircraft has failed to be ready for its allotted task.

On flights along normal RAF routes each Comet flies with a ground operator in the crew. Armed with a pre-packed selection of spares and tools, it is his job to make sure his aircraft gets back to Lyneham. Away from the regular routes the engineer may have two additional specialists to back him up and to ensure that the aircraft maintains its by-the-minute schedule.

Even the best maintained aircraft do develop faults sometimes and then, when major parts are needed, Lyneham-based experts fly out to service the aircraft. On a recent VIP trip a Comet was found to beun serviceable at Muharraq, in Bahrain, with a damaged engine. A replacement engine was quickly flown out from the UK and the two engineers worked against the clock in 100 degrees-plus heat to replace the damaged engine in less than eight hours. So speedy was the recovery that the Comet caught up with its VIP passenger who had continued his journey in another aircraft—and was able to resume the originally planned itinerary.

FIRE BOMBS

[*concluded*

Sqn on April 18, 1945. On April 24 similar attacks were made on targets at Flensburg, Schleswig, Lubeck and again Neubiberg. On the night of May 2/3, *Firebash* sorties were operated against Hohn, Schleswig and Westerland by three squadrons of 100 Group.

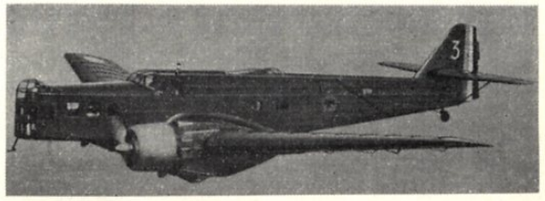
Napalm appears to have been withdrawn from use in the Italian and Burmese theatres before the end of April—Bomber Command was apparently the last to use it, right up to the end of the war in Europe.

Chronological summary

1944	
September 8	Request by Ops1/Tactics, ADGB, to AFDU for initial tests.
September 25	First (unarmed) trial flown by AFDU Typhoon.
October 12	Report on initial trials issued by AFDU.
October 21	Armed trials directive to AFDS from Ops1/Tactics, Fighter Command.
1945	
January 17	Report issued by CFE/AFDS on armed trials.
February 15	1st recorded operational use—221 Group, Burma (Thunderbolt).
April 9	1st recorded use in ETO—324 Group, Italy (Spitfire IX).
April 12	1st recorded use in W Europe—US 8th AAF, Bordeaux.
April 18	1st recorded use in Germany—100 Group, Munich (Mosquito).

Modelling world

JAMES GOULDING



. . . the Bloch 210 would not look out of place in a container depot . . .

Recently I have constructed a sample of Heller's Marcel Bloch 210 BN5 twin-engined night bomber—a kit in this manufacturer's 1/72 scale range of French aircraft types. The Bloch 210 was designed in 1933 and entered service with the *Armée de l'Air* during 1937. It was a medium-sized, five-seat night bomber powered by two Gnôme-Rhône 14N radial engines. Turret armament was carried in the extreme nose, in the mid-upper position and beneath the fuselage.

This aircraft was a typical example of French bomber design between the wars, which used flat sided panelling with external stiffeners—albeit, all-metal construction based on Wibault design methods. The results were some of the most ugly aeroplanes of all time. But, despite its looks, the Bloch 210 did possess a top speed around 200mph and was a fine, sturdy, viceless aeroplane. It is as well to reflect that our latest bomber at the time of the Bloch 210's first flight was the Handley Page Heyford biplane bomber.

Although the Bloch 210 would not look out of place in a container depot, I personally find something appealing and enchanting about this old bomber. Heller's kit makes up into a most interesting and delightful model that is quite different from the ordinary run-of-the-mill aircraft shapes that we are used to seeing.

Construction of the fuselage is quite complicated, and like many of Heller's models, there is a great deal of internal detail. The finished fuselage is extremely strong. As on many pre-war French bomber designs there is extensive glazing, which adds to the attractiveness of the model.

The wings are straightforward and have a realistic change of incidence (wash-out) from the outer wing root to the tip. One criticism that could be made of Heller is that occasionally it attempts to mould parts that are too thick, with resultant sinkage. On my sample of this kit sinkage had occurred on the fin, and some distortion of the wheels had taken place. The indentations on the fin could easily be filled with body putty, however, so there was no problem. The wheels I replaced with some old Airfix Hampden parts, which were an exact match. But these points apart, the rest of the kit is well-moulded. The fit of parts is good and general detailing is excellent.

The war load included in the kit consists of two 1 102lb bombs carried on racks, in tandem, on the centre-line of the fuselage.

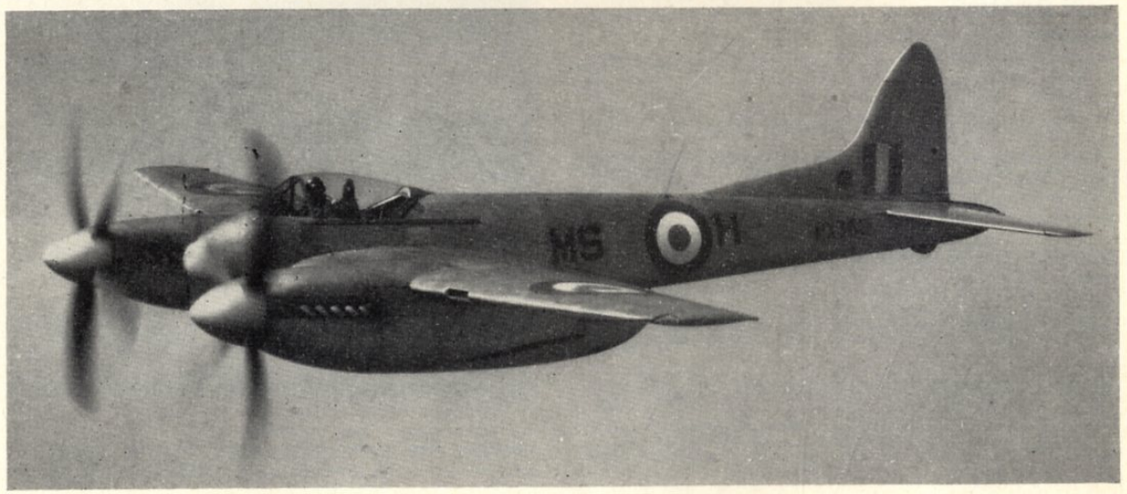
A simple transfer sheet is included for markings of *Groupe de Bombardement* 1/12, *Armée de L'air*.

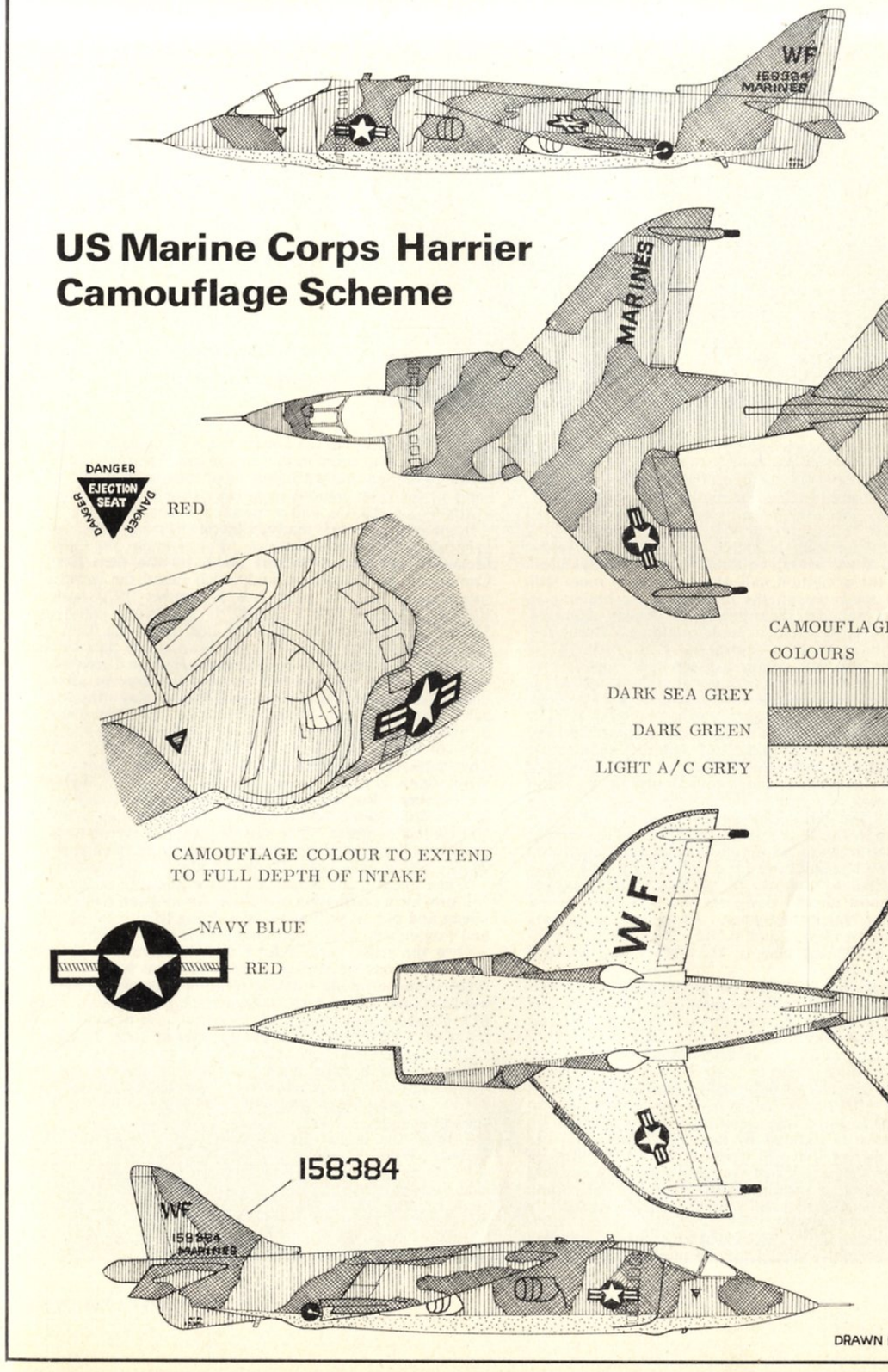
Bloch 210s, despite their obsolescence, carried out bombing attacks on Germany, and enemy targets in France and Belgium, and so this model qualifies for inclusion in any collection of World War II aircraft. Heller's model is a fine, accurate replica and is an unusual companion to our 1/72 Hampdens, Whitleys, Bf109s, Spitfires, Hurricanes, etc.

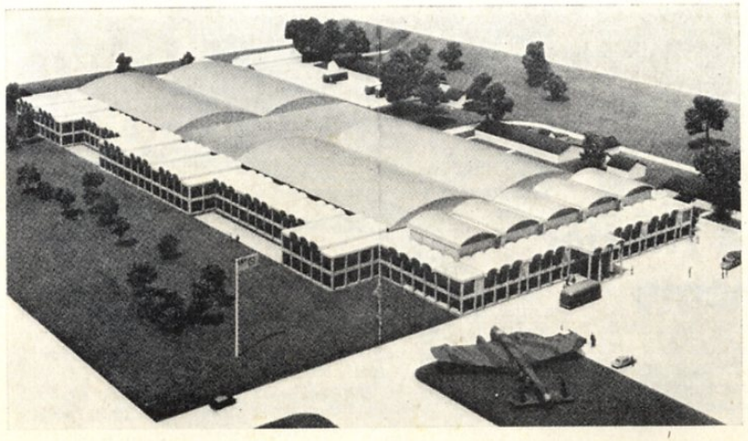
Cost of this kit is 92p.

My sample of Heller's Bloch 210 kit was supplied by Richard Kohnstam Ltd, 13-15a High Street, Hemel Hempstead, Herts.

Subject of the latest 1/72 scale Frog kit—to be reviewed next month—is the de Havilland Hornet III, whose elegant lines are seen to advantage in this study of PX382 from RAF Fighter Command's Hornet Conversion Flight.







Architects' model of the RAF Museum. The Whitley exhibit is wishful thinking!

RAF Museum progress

Opening scheduled for autumn of 1972

THE main structural work of the RAF Museum at Hendon is now virtually complete. All that remains is to seal the large doors in the side of one of the hangars and this will not be done until the last of the large aircraft exhibits has arrived at Hendon, been reassembled and moved inside.

But the museum itself is still a long way from being finished. Although several aircraft have already been positioned in the exhibition hall, there are many more still to come. At the moment, the interior of the building is being prepared, exhibits refurbished to display standard and caption boards written and mounted. Even the simplest caption may take several days to research to ensure that no relevant details are omitted. Opening is scheduled for the autumn of 1972 but it is dependent on a number of factors—including the maintenance of a tight time schedule for the preparation of the hundreds of exhibits, large and small, that will make up the initial display. Money, of course, is still very much in demand and, despite the most generous response from all quarters, more is still needed if justice is to be done fully to the history and traditions of the Royal Air Force.

Built around two existing hangars, the museum will have 175 000 square feet of floor space—sufficient to display only one fifth of the museum's total number of exhibits at any one time. The hangars have been linked by a hall which will be dedicated to the late Sir Sydney Camm, one of Britain's foremost aircraft designers and best remembered for the Hawker Hurricane fighter. Alongside the hangars run galleries on two levels, and at one end will be a refreshment room, a 200-seat cinema, the library and archives centre and sales area.

Some criticism has been levelled at the museum for not maintaining its aircraft in flying condition. However, the problem of finding or manufacturing spares for aircraft that have been out of production for decades, the amount of man-hours that would be involved and the enormous expense that would have to be borne by the taxpayer make this quite impossible. Additionally, should an aircraft crash it might well destroy the last remaining example of that particular type in the world. Finally, many were given on condition that they did not fly again. The museum has settled for a display that will illustrate the development of the Royal Air Force, both in men and machines, and has brought it as close as possible to the capital of the nation. It is, in fact, the only national museum devoted exclusively to aviation and aeronautics.

Although the aircraft exhibits will be to many the most exciting and evocative section of the display, the museum has not forgotten that the Service has been made by the men and women who serve in it. In the galleries, the emphasis is on the human side with displays of the personal effects of some of the most famous members of the Service, tributes to the VCs and GCs, and a special Trenchard display.

Some of the aircraft that will be on show have their own particularly interesting histories. For example, the Gloster Meteor is the actual aircraft flown by the then Group Captain E. M. Donaldson and which raised the world air speed record to 616 mph [see November 1970 issue—EDITOR]. Spitfire Mk I K9942 is the oldest surviving Spitfire in the world and the only one remaining from the original production batch. It was flown at one time by the late Flight Lieutenant J. B. Nicolson, Fighter Command's only VC. The museum has thirteen Spitfires in all but there is only room for two in the initial display—the Mk I and a Mk 24, the first and last of the line. The Supermarine Stranraer flying boat was built in Canada and is the last survivor of the long line of famous biplane flying boats. The Typhoon, presented by the Smithsonian Institution, Washington, is the only one in the world, as is the Wellington bomber. But there are many famous types which seem to have disappeared forever including the Hampden, Whitley and Halifax bombers. The museum has, however, managed to salvage some parts of extinct aircraft types from various wrecks which have been discovered around the country.

When opened, the Royal Air Force Museum at Hendon will provide a fascinating exhibition for aviation enthusiasts young and old, as well as being a fitting tribute to the men and women who have given their lives for the nation.

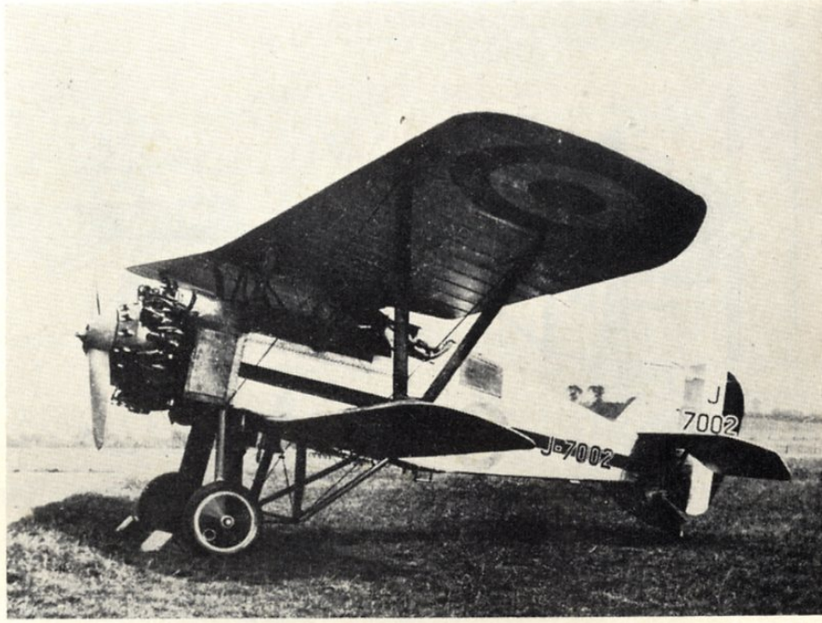
Over the years, various RAF stations have formed their own collections of vintage aircraft to save some famous types from becoming extinct. Maintaining old aircraft is a time-consuming task and it says much for the enthusiasm of the stations concerned that personnel have devoted great many of their off-duty hours to the care of these historical exhibits. The RAF Museum is able to draw on these collections for its initial display at Hendon, and the remaining aircraft will be on show to the public at stations' "At Home" days until such time as there is room for them at the museum.

One of the largest station collections is that of RAF Colerne, Wilts.

"Lets go out and cut one from the hedgerow" was the odd decision when the museum at Colerne was faced with replacing the irreparably damaged propeller of a vintage Mosquito. Corporal David Johnson, until recently the museum's 'curator' and general factotum, studied the

[*continued on page 204*

RIGHT: Siskin III J7002 sporting the black bar markings of the famous 'Treble One' Squadron.

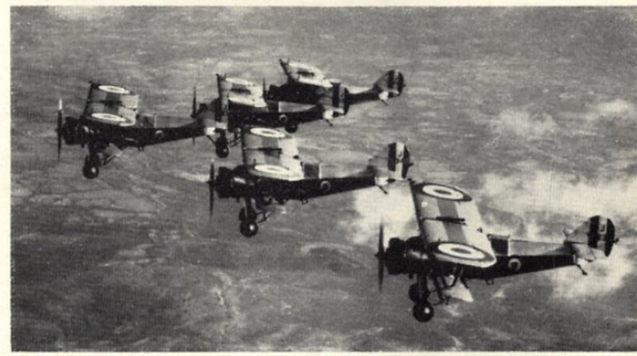


AW Siskin squadron markings

PART 1 OF A COMPREHENSIVE READY-REFERENCE GUIDE

DEVELOPED from the Siddeley SR2 Siskin (ABC Dragonfly engine) of 1919 *via* the Armstrong Whitworth Siskin II trainer and fighter aircraft, the Siskin III single-seat fighter (325hp Armstrong Siddeley Jaguar) helped to replace the Sopwith Snipe in squadron service after World War I. First squadron to receive the Siskin III, in May 1924, was No 41 at Northolt, followed soon afterwards by No 111 at Duxford. They were the only two squadrons to get the Mk III but in 1927 the Mk IIIA (420-425 supercharged Jaguar IV) entered service and this mark eventually equipped eleven squadrons. The Siskin IIIA was widely sub-contracted—by Blackburn, Bristol and Gloster—and some aircraft were completed as, or converted to, 2-seat trainers.

Despite its ungainly appearance, the Siskin was safe and easy to fly (although not always easy to land, being an incorrigible wing-dropper) and it will always be associated with the Hendon Displays where its formation drill and aerobatics made it a sight to remember. The Siskin's peculiar sesquiplane layout necessitated the marking of wing roundels on the underside of the top wing instead of on the lower one. Because of the top wing's generous chord, the roundels were unusually large, and the overall effect from any angle was very eye-catching indeed as the photographs and drawings show.—**P.J.R.M.**



Two pages of 1/72 scale drawings overleaf ▶

ABOVE: Siskin IIIAs of 41 Sqn. BELOW: Siskin IIIAs of 29 and, in background, 43 Sqn. Colour details overleaf.

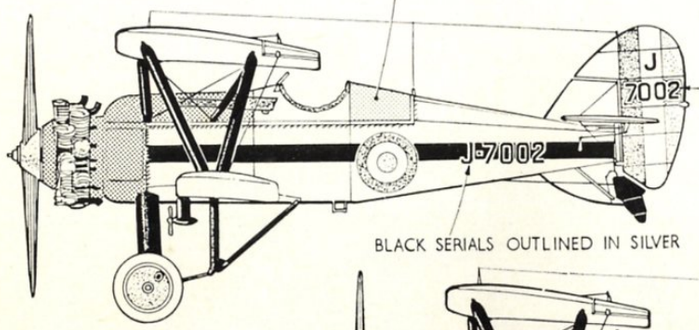
R A F SQUADRON MARKINGS

ARMSTRONG WHITWORTH SISKIN

Sheet 1 of 4~the SISKIN III

SCALE: 1/72

STANDARD FACTORY FINISH WAS SILVER DOPE WITH DARK GREEN 'ANTI-GLARE' COWLINGS. STRUTS & UNDERCARRIAGE WERE BLACK. THE RADIO COMPARTMENT COVER AFT OF COCKPIT WAS GREY.



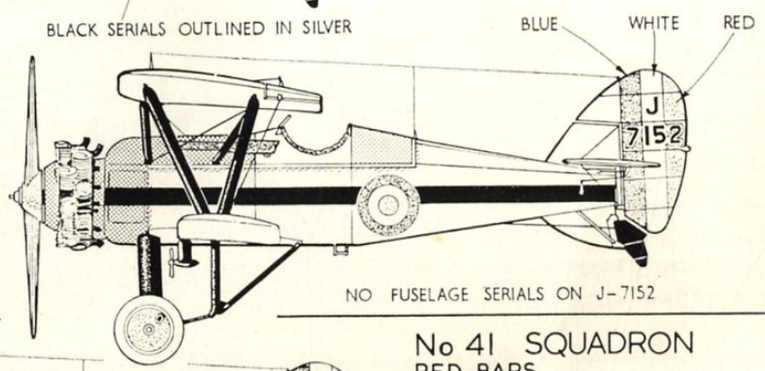
BLACK SERIALS OUTLINED IN WHITE WHERE NUMERALS OVERLAPPED BLUE & RED STRIPES

BLACK SERIALS OUTLINED IN SILVER

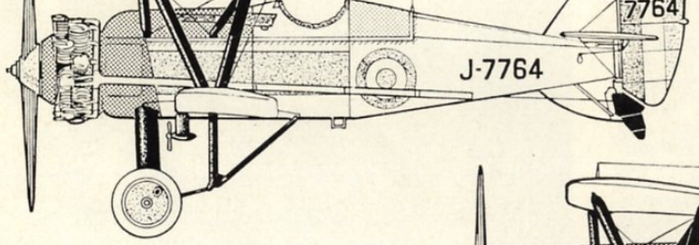
RED AIRSCREW BOSSES & RED WHEEL DISCS ON BOTH J-7002 & J-7152

NOTE HOW BLACK STRIPE EXTENDS TO ENGINE ON J-7152

No 111 SQUADRON
BLACK BARS

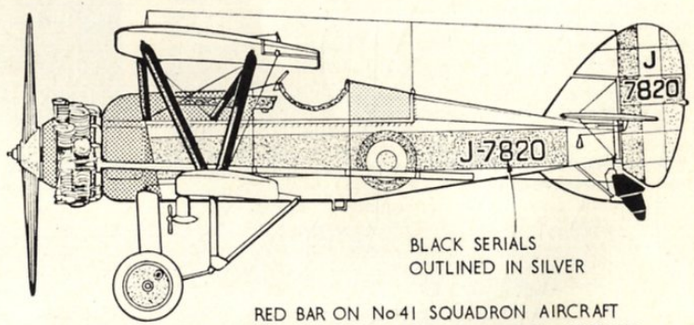


NO FUSELAGE SERIALS ON J-7152



No 41 SQUADRON
RED BARS

NOTE THE REVISED COWLING LINE ABOVE UNDERCARRIAGE STRUT & ADDITION OF EXHAUST PIPES TO BOTH THESE SISKIN III.'s UNDERCARRIAGE LEGS ON J-7820 WERE NATURAL METAL FINISH.



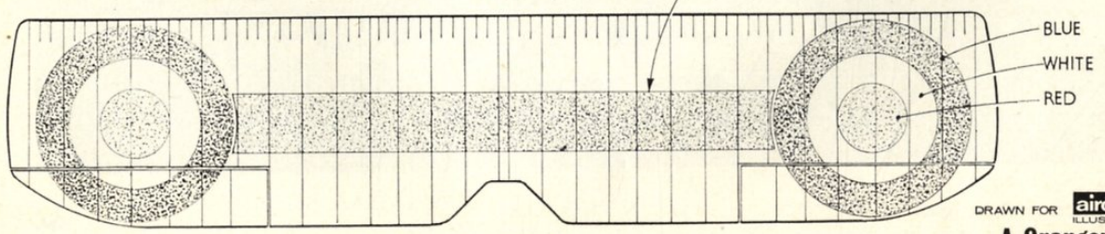
BLACK SERIALS OUTLINED IN SILVER

RED AIRSCREW BOSSES & RED WHEEL DISCS ON BOTH J-7764 & J-7820.

THE SISKIN III WAS USED BY BOTH No 41 SQUADRON & No111 SQUADRON FROM 1924 UNTIL REPLACED BY THE SISKIN IIIA IN 1927 (SEE SHEET 2)

NO UNDERWING SERIALS WERE CARRIED ON THE SISKIN III (SEE SHEET 2 FOR ROUNDELS ON UNDERSIDE OF WING) UPPERWING ROUNDELS & SQUADRON MARKINGS SHOWN BELOW

RED BAR ON No 41 SQUADRON AIRCRAFT
BLACK BAR ON No 111 SQUADRON AIRCRAFT



DRAWN FOR aircraft ILLUSTRATED
BY A.Granger. AMITAI

R A F SQUADRON MARKINGS

ARMSTRONG WHITWORTH SISKIN

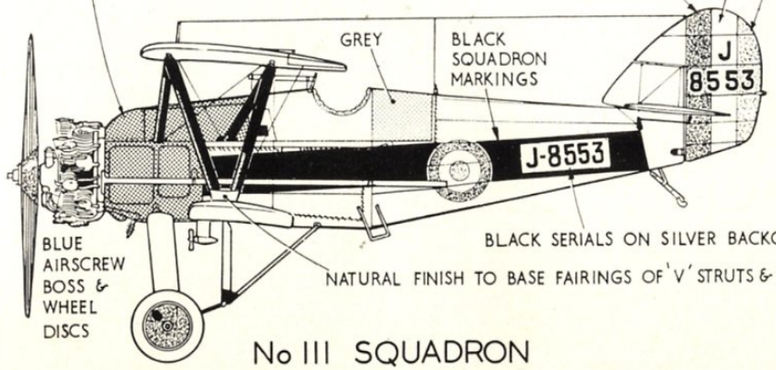
Sheet 2 of 4 ~ the SISKIN III A

SCALE: 1/72

DARK GREEN 'ANTI-GLARE' FINISH

BLUE WHITE RED

FACTORY FINISH AS SISKIN III (SEE SHEET 1)

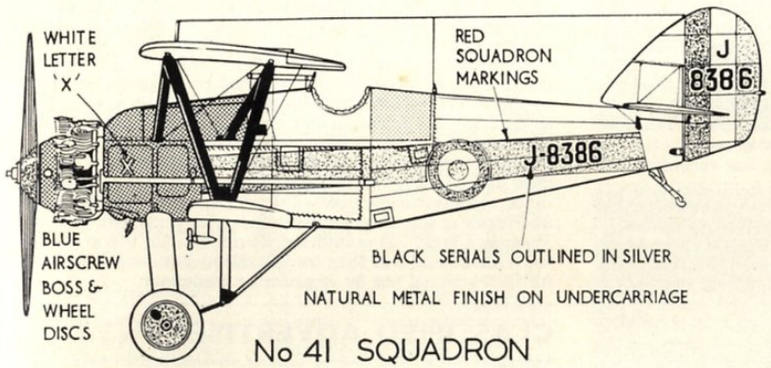


BLUE AIRSCREW BOSS & WHEEL DISCS

BLACK SERIALS ON SILVER BACKGROUND

NATURAL FINISH TO BASE FAIRINGS OF 'V' STRUTS & UNDERCARRIAGE

No 111 SQUADRON



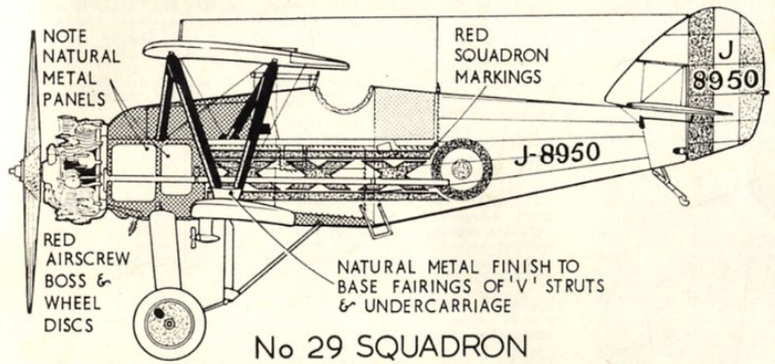
NOTE REVISED FOOT STEPS, SHORTER EXHAUSTS & EXTRA ENGINE COWL ON J-8386

BLUE AIRSCREW BOSS & WHEEL DISCS

BLACK SERIALS OUTLINED IN SILVER

NATURAL METAL FINISH ON UNDERCARRIAGE

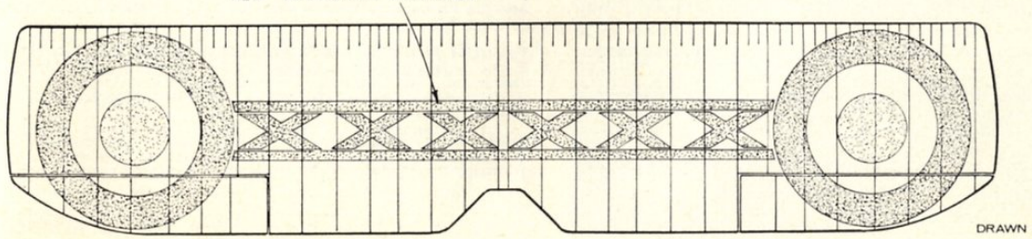
No 41 SQUADRON



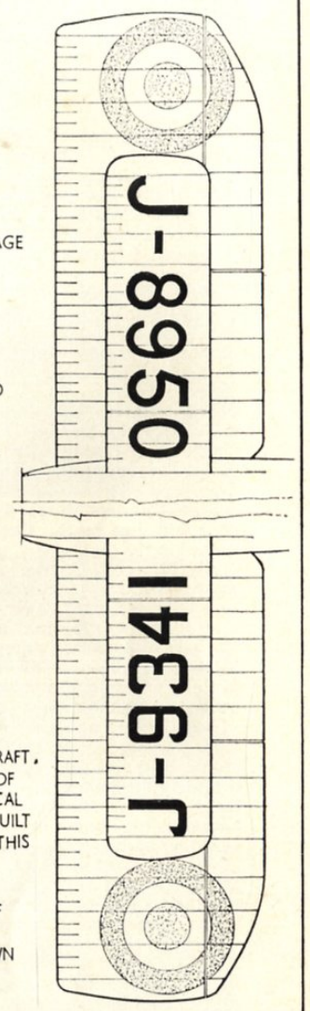
RED AIRSCREW BOSS & WHEEL DISCS

NATURAL METAL FINISH TO BASE FAIRINGS OF 'V' STRUTS & UNDERCARRIAGE

No 29 SQUADRON
RED SQUADRON MARKINGS



J-8950 WAS BUILT BY GLOSTER AIRCRAFT. NOTE STYLE OF SERIALS, TYPICAL OF GLOSTER BUILT AIRCRAFT OF THIS PERIOD. COMPARE EXAMPLES OF UNDERWING SERIALS SHOWN AT RIGHT



ROUNDELS WERE PAINTED ON UNDERSIDE OF TOP WING. BLACK UNDERWING SERIALS WERE PAINTED WITH TOPS TOWARD LEADING EDGE ON STARBOARD WING & TRAILING EDGE ON PORT WING.

DRAWN FOR aircraft ILLUSTRATED
BY A.Granger. AMITAI

RAF MUSEUM PROGRESS

concluded from page 200

remains of the curved blade and struggled to recall the nagging memory of seeing similar workmanship before. Then he downed tools and strode off to a field adjoining the airfield—and from the hedge he plucked not one but a dozen or more Mosquito propeller blades which years previously had been hammered into the ground as fence posts!

Such moments of stumbling across relics of aviation history are few. On another occasion, a station driver was returning through Wales at the wheel of an empty "Queen Mary", a 52-feet long articulated vehicle, when he stopped for lunch. During his short stay in the village he met the one local man who was in a position to say: "If you've got transport, I have an old Tiger Moth you can take away with you."

Most of the time, however, luck has no part to play in the museum's work. Perseverance, attention to minute detail and an ability to build replacement parts from plans photos and even memory have been mainstays in building up the museum collection from seven aircraft to 18 during the past six years.

The museum was formed almost by chance from a nucleus of old aircraft brought together by 36 Squadron which flew Hastings from Colerne. Corporal Johnson jumped at the chance to help maintain the aircraft in a spare time capacity, and his enthusiasm and skill was officially recognised when he was invited to look after the museum on a full time basis. Corporal Johnson has recently been posted to the Gulf where, no doubt, he is scouring the desert sands in search of more aircraft relics to refurbish. He has handed over his charge to Corporal Albert Coombes.

A Heinkel He162 Salamander, a Mosquito, a Tiger Moth and a Flying Flea are among the aircraft in this West Country haven which offers a fascinating glimpse of aviation history. Today the collection is priceless, for most of the exhibits are unique development models or sole remaining examples of their type.

Both Britain and Germany are represented with aircraft types varying from the 1936 Flea (notorious in its day for killing its pilots and subsequently banned from flying) to the German-built Salamander, a jet-propelled product of the final days of World War II. Among the post-war aircraft is the Hunter in which Neville Duke set a 727.6 mph world air speed record in the middle fifties.

There is more to maintaining a museum than meets the eye—putting aside the four days or so that it takes to sweep out the hangar or the many hours of dusting involved in keeping the aircraft shining bright.

Age and the elements have often taken a heavy toll of the machines which are brought to the museum and they must undergo a detailed programme of restoration. The biggest task was a similar re-build of a Mosquito which was converted back from its Mk 35 target towing form to its original Mk 34 photo reconnaissance layout. And Corporal Johnson threw in a little research during that task to establish that the aircraft spent most of its life on photo reconnaissance missions with 98 Squadron flying from Brussels.

This aircraft, the only pressurised Mosquito, is scheduled to join the exhibits at the RAF Museum. A Tiger Moth, refurbished at Colerne and seen during the RAF's 50th anniversary celebration at RAF Abingdon, will also go to the museum. A Spitfire, given by a London scrap dealer, did duty as a stage prop for the filming of *Battle of Britain*. It was found to be in such good shape that it was made airworthy and joined the Battle of Britain Historic Flight at RAF Coltishall.

Since it opened in 1938, RAF Cosford has been the home of No 2 School of Technical Training and is tasked with training both craft apprentices and adults, including WRAF personnel.

Another of the main collections of historic aircraft in this country is that at RAF Cosford, Staffs.

Pride of the collection is a Japanese Kawasaki Type 5 Model 1B. First encountered in March 1945, this aircraft possessed a definite ascendancy over the American Hellcat and Mustang. Its excellent performance was just as much a surprise to the manufacturer as it was to the Americans and it resulted from allied bombers destroying an engine factory tasked with supplying the in-line engine required by this new fighter. In an attempt to rectify the situation Kawasaki fitted a radial, the only other available engine in the vicinity. The performance of the hybrid result was beyond all expectations, but was short-lived, as the Americans soon removed that factory as well, and only 90 aircraft were produced.

It has a 14-cylinder Mitsubishi Ha-112-11 Type 4 engine of 1 500hp, a maximum speed of 367mph, and a range of 1 243 miles. The aircraft at Cosford was probably one from No 5 Fighter Squadron based at Chofu or Yokkaichi, in defence of the Japanese mainland. In addition to its armament of two German 20mm Mauser MG 151 cannons and two 12.7mm machine-guns in the upper decking of the fuselage, two 550lb bombs could also be carried on underwing pylons.

Another very important aircraft in the Cosford collection is the Gloster F9/40 DG202, the first of 12 aircraft ordered by the Ministry of Aircraft Production on February 7, 1941, to the F9/40 specification and was, in fact, the first prototype Meteor to fly in the RAF. After extensive taxying trials it took to the air and after a total of 365 hours the port engine blew up on take-off, causing extensive damage to the nacelle, outer wing and centre-section structure. After modification and repair it was used for aircraft carrier trials with HMAC *Pretoria Castle*. It completed its operational life at Moreton Valence and was then transferred to Training Command for instructional use by engineering tradesmen.

British civil aircraft register

Compiled by MICHAEL STROUD

NEW ADDITIONS

Registration	Type	C/n	Owner or Operator
G-AYPM	Super Cub 90	18-1373	Three Counties Aero Club
G-AYPN	Super Cub 90	18-1600	Three Counties Aero Club
G-AYPO	Super Cub 90	18-1615	Three Counties Aero Club
G-AYPP	Super Cub 90	18-1626	Three Counties Aero Club
G-AYPR	Super Cub 90	18-1631	Three Counties Aero Club
G-AYPS	Super Cub 90	18-2092	Three Counties Aero Club
G-AYPT	Super Cub 90	18-1533	Three Counties Aero Club
G-AYPU	Cherokee Arrow 200	7135005	CSE Aviation Ltd
G-AYPV	Cherokee 140D	7125039	CSE Aviation Ltd
G-AYPW	Cherokee Arrow 200	28R-35791	HRH Prince William of Gloucester
G-AYPX	BN-2A Islander III	245	Britten-Norman Ltd (ex G-51-245)
G-AYPY	Slingsby Falke	1723	Vickers Ltd
G-AYPZ	Campbell Cricket	CA343	Campbell Aircraft Ltd
G-AYRA	Campbell Cricket	CA344	Campbell Aircraft Ltd
G-AYRB	Campbell Cricket	CA345	Campbell Aircraft Ltd
G-AYRC	Campbell Cricket	CA346	Campbell Aircraft Ltd
G-AYRD	Campbell Cricket	CA347	Campbell Aircraft Ltd
G-AYRE	Campbell Cricket	CA348	Campbell Aircraft Ltd
G-AYRF	Cessna F150K	0665	Lowland Aero Service
G-AYRG	Cessna F172H	0761	Lowland Aero Service
G-AYRH	MS892A Rallye	10558	J. D. Watt (ex F-BNBX)
G-AYRI	Cherokee Arrow 200	7135004	Peter Clifford Aviation Ltd
G-AYRJ	LeVier Cosmic Wind	101	R. I. McCowen (ex N20C)
G-AYRK	Cessna 150J	70856	Lonmet Aviation Ltd (ex 5N-AII)
G-AYRL	SF531 Milan	6606	Aspen Developments Ltd
G-AYRM	Cherokee 140 D	7125049	Express Aviation Services
G-AYRN	Schleicher ASK-14	14050	Messrs Cadisch, Barton, Ryan, Beck and Letts
G-AYRO	Cessna FA150	0102	Brymon Aviation Ltd
G-AYRP	Cessna FA150	0101	Brymon Aviation Ltd
G-AYRR	HS 125 Srs 600B	25258	Hawker Siddeley Avn
G-AYRS	Jodel D120	255	General Aviation Services (ex F-BMAV)
G-AYRT	Cessna F172K	0777	Lulsgate Air Services Ltd
G-AYRU	BN-2A-6 Islander	181	Britten-Norman Ltd (ex OH-BNA/G-51-181)
G-AYRV	BN-2A-7 Islander	233	Britten-Norman Ltd (ex G-51-233)
G-AYRW	BN-2A-3 Islander	272	Britten-Norman Ltd (ex G-51-272)
G-AYRX	BN-2A-3 Islander	273	Britten-Norman Ltd (ex G-51-273)
G-AYRY	HS 125 Srs 1B	25105	McAlpine Aviation Ltd (ex D-CKCF)
G-AYRZ	Boeing 707-321	18084	Lloyd International Airways (ex N758PA)
G-AYSA	Aztec C	27-3799	Peter Clifford Aviation (ex N6509Y
G-AYSB	Twin Comanche C	30-1916	Peter Clifford Aviation (ex N8760Y)
G-AYSC	BAC One-Eleven 518	235	Court Line (Aviation) Ltd
G-AYSD	T-61 Falke	1726	Vickers Ltd
G-AYSE	Navajo 300	31-323	J. S. Selby (ex 9Q-CSO)
G-AYSF	Aztec D	27-3996	Eastleigh Ltd (ex N6777Y)
G-AYSG	Cessna F172H	0758	Rogers Aviation Ltd
G-AYSH	Taylor JT-1	PFA1413	C. J. Lodge
G-AYSI	Boeing 707-373C	18707	Britannia Airways (ex N373WA)
G-AYSJ	Bucker Jungmeister	38	S. B. Riley (ex HB-MIW/U-91)
G-AYSK	LA4A Minor	PFA832	L. Plant
G-AYSL	Boeing 707-321	17599	Dan-Air Services Ltd (ex N721PA)
G-AYSM	BN-2A Islander	641	Britten-Norman Ltd
G-AYSN	BN-2A Islander	642	Britten-Norman Ltd
G-AYSO	BN-2A Islander	643	Britten-Norman Ltd
G-AYSP	BN-2A Islander	644	Britten-Norman Ltd
G-AYSR	BN-2A Islander	645	Britten-Norman Ltd
G-AYSS	BN-2A Islander	646	Britten-Norman Ltd
G-AYST	BN-2A Islander	647	Britten-Norman Ltd
G-AYSU	BN-2A Islander	648	Britten-Norman Ltd
G-AYSV	BN-2A Islander	649	Britten-Norman Ltd
G-AYSW	BN-2A Islander	650	Britten-Norman Ltd
G-AYSX	Cessna FR177RG	0024	Brymon Aviation
G-AYSY	Cessna FR177RG	0026	Brymon Aviation
G-AYSZ	Cessna FA150	0092	Lulsgate Air Services

G-AYJI Britten-Norman BN2A Islander, Rumanian-built. [P. J. Hutt

G-AYNF Piper Cherokee 140C. [S. P. Tibble

G-AYOO Britten-Norman BN2A Islander. [P. J. Hutt

G-AYOW Cessna C182 Skylane. [D. A. Conway

Airview

A monthly look at the home aviation scene

by PETER R. MARCH

Airfield review.....Swansea

FROM time to time we will take a closer look at an individual airfield that does not regularly hit the headlines. For the first of these we have taken Swansea (Fairwood Common) in South-West Wales. Owned by Swansea Corporation, this ex RAF airfield is located 5 miles WSW of the city. It has three tarmac runways, the longest being 4 280ft, and can take piston aircraft up to DC-4/6 size but is unable to accommodate the present range of jet transports. Facilities for visitors are excellent, with good public enclosure and airport restaurant. At present there are no scheduled operators from Swansea, although several airlines, including Progressive Airways, have put forward tentative plans.

The principal users are business and executive aircraft (British Steel Corpn, Ford Motor Co, Fred Olsen, etc), club and light aircraft, and the ATC with its Sedberghs and Cadets. Current (March 1971) residents are Cessna 150s G-ARAU and 'VAR, Cessna 172 G-AVIC, Cessna 175 G-ARCL, Cessna P206 G-AWUA (one of few examples on British register,) Cessna 337 G-AYHW, Cherokee 140 G-AVLC, Cherokee 180 G-ATOT, Comanche 180 G-ARHI, Nipper 2 G-ARDY, Nipper 3 G-AVKI, homebuilt Jodel D11 G-AWMD (photo 1),Falco G-AROT (photo 2), Slingsby T21B WB941, and Cadets WT903 and XN240 of 636 Gliding School.

Rolls-Royce flight test centre

It was announced on March 10 that Rolls-Royce is to concentrate its flight test department at Filton, closing down the Hucknall unit as part of its economy measures. Currently the Bristol Engine Division is operating Vulcan XA903 (Olympus 593B), Harrier XV738 (Pegasus) (photo 3), HS125 G-ARYC (Viper 600), Jet Provost T5 XS231 (Viper 202), Sea King XV371 (Gnome H1400), Scouts XP190 and XR632 (Nimbus 102), Gnat XP514 (Orpheus 101). In addition Gnat XM694 is used as a chase aircraft, while Jetstream G-ATXH stands derelict. The communications aircraft, which had their titles painted out when the firm crashed, remain HS125s G-ATPB and G-AXLX (Turbo-Union), Doves G-AJGT and G-AMZY, and Argosy G-APRM. To the flight test department at Filton will be added Phantom, VC10 and, later in the summer, Jaguar.

Islander and Trislander

Islanders continue to flow from the Britten-Norman production line at Bembridge. The following production list continues that started in the September 1970 issue of AIRCRAFT ILLUSTRATED.

180 EI-AUL
181 OH-BNA/G-AYRU
182 G-AYGS/ZS-IJA
183 G-AYGT
184 N862JA
185 N866JA
186 F-OGFA
187 N870JA
188 OY-DHS
189 —
190 G-AYGU/XU-BAE
191 G-AYGV
192 G-AYGW/ZS-IJB
193 G-AYGF
194 G-AYHK/VH-RTK
195 G-AYHL/VH-ISB
196 F-OCPY
197 G-AYLR
198 N31JA
199 N32JA
200 G-AYMB
201 N33JA
202 N34JA
203 YV-O-MOP-12
204 G-AYMC
205 G-AYIS
206 SE-FTA
207 G-AYKP/VH-ISC
208 SE-FTB
209 N36JA
210 N37JA
211 N38JA
212 CF-GAQ
213 G-AYNH
214 4X-AYB
215 N111VA
216 G-AYNI
217 G-AYKR/VH-MIB
218 OH-BNB
219 —
220 F-OCRG
221 F-OCRH
222 N40JA
223 N41JA
224 N132JL
225 N131JL
226 G-AYON
227 G-AYLF
228 N42JA
229 N43JA
230 8R-GDN
231 8R-GDQ
232 —
233 G-AYRV
234 N444TW

Some allocations have been made right up to c/n 273 G-AYRX. Among the recent deliveries has been 9J-ACC (c/n 254), the second of five for the Zambian Flying Doctor Service, at the end of February. Its colour scheme is white overall with dark and light blue trim and red crosses on fin and under the wings. Two were also delivered to the Guyana Defence Force at the beginning of March in civil guise as 8R-GDN and 'GDQ.

The first production Trislander made its maiden flight from Bembridge on March 6 as G-51-245. Minor differences from the prototype G-ATWU (which is now a structural test aircraft) include an extension to the upper fin aft to correspond with the trailing edge of the rudder, and a rounder profile for the third engine to give a similar appearance to those mounted on the wings. First deliveries of the Trislander will be to Jersey-based Aurigny Air Services.

It seems likely that the next newcomer from the same stable will be a fully militarised Islander with increased fuel capacity from wing-tip tanks, more sophisticated avionics and reinforced freight floor. Under-wing stores such as rockets and light bombs could be fitted. Its appeal to governments far and near for counter-insurgency, border patrols and territorial water supervision seem obvious. C/n 243 has been allocated to the prototype. (See also page 170)

Service news

Honington has now become a Shackleton base (in addition to its Buccaneers). 204 Squadron moved in from Ballykelly with its Shackleton MR-2s during March, completing the move by April 1. Eventually this squadron will become the main UK search and air rescue squadron in addition to its shipping surveillance duties.

The RAF Training Command aerobatic teams will be much the same as previous years in 1971 — *Red Arrows, Pelicans, Blades, Macaws, Poachers* and *Gemini* pair—but with Jet Provost T5s much more in evidence.

By the beginning of April six Pumas had been delivered to the training and conversion unit at Odiham. The first squadron, No 33, will form at this airfield during the summer and should be operational by September.

655 Squadron, Army Air Corps, at Detmold, Germany, will be the first fully operational anti-tank guided weapon squadron later this summer when it receives its full complement of modified Scout AH1s. The strengthened helicopter is fitted with four Nord SS11 wire-guided missiles. Photo 4 shows a Scout of the Helicopter Weapons Flight, Middle Wallop.

819 Sqn, mentioned last month, has in fact re-commissioned at RNAS Culdrose as a Sea King squadron. It will move to Prestwick later in the year when crew training has been completed. The squadron was recently in the news when one of its aircraft (VX671) was called in to rescue an RAF Whirlwind which had crashed on sands near Chivenor. Photo 5 shows the location of the squadron badge on the front fuselage and the large code numbers 02.

Around and about

The resurrection of Hunters from all corners of the RAF continues, to meet the insatiable demand from overseas air forces. At Bitteswell, where rebuilding work is centred, recent arrivals have been 7956M (XF950) and 7943M (WW589) from Halton. Deliveries of the F71s to Chile and F74s to Singapore are currently being made.

At Lasham seven ex French military Piper Cubs are being restored for use as glider tugs. Registered G-AYPM to 'YPT, all but G-AYPS were flown in.

A rare visitor to Heathrow on February 21 was Union of Burma Airways' Boeing 727 XY-ADR (Photo 6) on a special flight.

Flown in to Bristol-Lulsgate on March 2, Varsity T1 WF410 will be permanently parked adjacent to the A38 road by its new owner, Brunel Technical College, who will use it for practical engineering purposes.

At Blackbushe, Cosmic Wind N20C flew on January 28 after assembly to become a welcome addition to the air racing scene in 1971. Stearman 5Y-KRR arrived on February 10 for rebuilding by Robinson Aircraft.

En route to Iran, Dakota EP-TWB (photo 7) called at Prestwick on February 28. Painted in two shades of blue, the Dakota was distinctive in having a radar nose and other super VIP fittings.

1

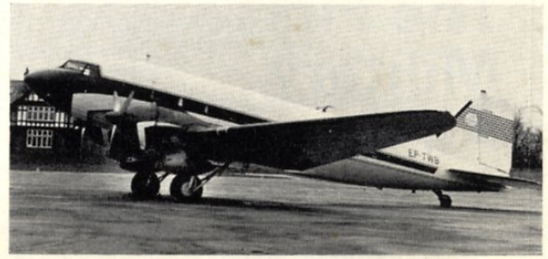

2


3


4


5


6


7


8


Flying from Lakenheath has stopped until September whilst extensive runway repairs are made. During the summer the Super Sabres of the 48th TFW will operate from Mildenhall and Wethersfield, bringing the latter out of its care and maintenance role.

Turkish Airlines' Boeing 707 TC-JAJ passed through Shannon on delivery on January 18 and has since received some attention from Aviation Traders at Stansted,

Another Taylor Titch (G-AXYK) is taking shape at Biggin Hill. Cyril Oakins hopes to get airborne in his all-red homebuilt before the summer.

With the *Battle of Britain* film well over, the RAF has been re-locating some of its gate guardians. Spitfire IX TE311 has taken up residence at RAF Benson, for example.

Airliner deliveries through Shannon included DC-9 I-DIZO to Alitalia on Feb 26, DC-9 PH-MAX to Martinair on Feb 26, Boeing 727 7T-VEA to Air Algerie on Feb 27, Boeing 707 9M-AQB to MSA on March 2, and Boeing 747 EI-ASI to Aer Lingus on March 6.

Army aircraft preservation scene

In keeping with the RAF and RN, the Army Air Corps is making strenuous efforts to prevent its history from sliding into obscurity. Unfortunately, funds are not presently available for a museum building to be constructed or made available for its collection of aircraft and helicopters to be put on view to the public, and the temporary accommodation at Stockwell Hall, Middle Wallop, has now been relinquished. Among the aircraft now stored at Middle Wallop and to be put on display at the Open Day (July 31) are Auster AOP9 WZ721, Skeeters XL813, XL814, XN344, Beavers 7735M (XL812), XP770, ML Utility XK776, and Camel replica (G-AWYY) (Photo 8), the last two being airworthy. There are also Scouts and Sioux earmarked for preservation. Auster AOP9 WZ670 stands at the gate.

More diary dates

Since the first list of provisional display dates was compiled last month quite a number of additional events have been notified:

May 16 Nottingham Air Display, Tollerton.
May 23 Coventry Air Display, Baginton.
May 31 RAFA Displays at North Weald, Church Fenton and Henlow.
June 6 RNAY Fleetlands Open Day.
June 26 RAFA Displays at Exeter, Woodford and Turnhouse.
July 3 RAF Topcliffe Open Day.
July 10 RAFA Displays at Cottesmore and displays at Sleap and Blackbushe.
July 11 Air Display Wycombe Park (Booker).
July 17/18 F5 and PFA Rally, Sywell. Strongbow Trophy, Shobdon.
August 7 RAF Chivenor Open Day.
August 15 Manchester Air Show, Barton.
August 29 Blackbushe Air Show (*Barnstormers*).
August 29/30 Goodyear Trophy Meeting, Halfpenny Green.
September 1-5 Business and Light Aviation Show, Cranfield.
September 4 RAF Little Rissington Open Day.
September 18 RAF Battle of Britain Air Displays.

[*For some of this month's news and photographs we are indebted to Messrs D. A. Conway, S. Davidson, J. Guthrie, G. D. Herbert, R. Levy, D. Molyneux, G. M. Nason, D. M. Sargent, E. A. Shackleton, S. P. Tibble and A. J. Wright. Also* Blackbushe Aviation Review, Air-Strip (MCAS), Prestwick Newsletter *and the Army Air Corps.*

ADVERTISEMENT

BOOK NEWS

IAN ALLAN Shepperton, Middlesex. No 25 MAY 1971

The First Military Air Service

PICTORIAL HISTORY OF THE GERMAN ARMY AIR SERVICE 1914-1918 by **Alex Imrie** published at the end of May tells for the first time in one volume, the story of the birth and death of the first military air service. Many of the techniques used in the German Army Air Service, and the lessons learned were applied in the later Luftwaffe. The 250 original photographs in this book trace the growth of the German Army Air Service from its first hesitant steps to the powerful force which was ground into oblivion by the Treaty of Versailles.

Details: 9″×6″ 72 *pages* (*plus* 104 *pages of illustrations*) **£2.55**

OTHER MAY PUBLICATIONS

STEAM IN THE BLOOD by R. H. N. Hardy **£2.55**
LONDON & SOUTH WESTERN LOCOMOTIVES by H. C. Casserley **£3.00**
SALUTE THE CARTHORSE Philip A. Wright **£1.50**

Its tremendous popularity has called for a third reprint of **Alfred Price's PICTORIAL HISTORY OF THE LUFTWAFFE**. This step-by-step history of Hitler's airforce includes scores of never before published photographs, many acquired by the author while researching among those German senior officers who survived. Highly acclaimed when it first appeared, the book has been widely reviewed: "This is an excellent book, which not only gives a history of the Luftwaffe, but also provides the modelmaker with valuable reference on aircraft markings". *Airfix*

"A well produced volume which will enhance the collection of anyone with an interest in Luftwaffe affairs". *Air Clues*

"The section covering 1939-1945 is a treasure trove for enthusiast and modeller alike . . . an excellent book which will provide hours of browsing". *International Plastic Modeller's Magazine.*

"Recommended capsule history in a class of its own". *Flying Review International*

Details: 9″×6″ 176 *pp* (*including* 112*pp illustrations*) **£2.25**

BRITISH CIVIL AIRCRAFT REGISTER by **Gordon Swanborough & John W. R. Taylor** contains, for the first time, in one volume all British civil aircraft registered since 1919. Over 16,000 of them, including the original K-100 to K-175 batch, up to G-AWZZ. Brief technical specifications given of every aircraft listed.

Details: 7¼″×4⅞″ 256*pp* (*plus* 32*pp of illustrations*) **£2.50**

From Our Book List

PICTORIAL HISTORY OF THE RAF
J. W. R. Taylor & P. J. R. Moyes
Vol 1 1918-1939 This volume on the RAF's formative years has just been reprinted again—the fourth time. **£2.25**

Vol 2 1939-1945 The second world war when history was made. **£2.00**

Vol 3 1945-1969 Including a review of disastrous decisions and indecisions of successive Governments between 1957-67. **£2.00**

Aircraft Albums

HANDLEY PAGE: AN AIRCRAFT ALBUM
Donald C. Clayton **£1.50**
Every HP aircraft whether it flew or not from the 1909 Bluebird to the Jetstream.

HEINKEL: AN AIRCRAFT ALBUM
P. St. John Turner **£2.00**
An account of the development, features and career of each of the Heinkel aircraft types constructed, with full specifications.
(Coming this summer are albums in the same series on Junkers and Messerschmitt).

It is regretted that, owing to further increases in postal charges, queries can be answered and orders acknowledged only when a stamped and addressed envelope is enclosed.

Books are obtainable from leading booksellers, or direct from the Retail Department (address above). Please send remittance with order, plus 10p per £ for postage and packing. A complete book catalogue is obtainable at 5p

YOUR INTERNATIONAL MODEL MAIL ORDER HOUSE

Suppliers to the British and Overseas Governments

BOOK DEPT.

The Jew with The Blue Max	Caler	88p
Marseille Star of Africa	Caler	88p
US Navy Markings WWII Pacific Theatre	Caler	£1.18
The Art Chester Story	Caler	£1.18
The Tin Goose	Aero	£1.75
Racing Planes Vol 1 1900-1923	Aero	£1.75
Racing Planes Vol 2 1924-1931	Aero	£1.75
Racing Planes Vol 3 1932-1939	Aero	£1.75
Racing Planes Vol 4 1946-1967	Aero	£1.75
Junkers JU-87	Caler	58p
The 9th Air Force in World War Two	Aero	£4.50
Luftwaffe in World War Two	Aero	£1.75
US Army Air Forces in the Pacific	Aero	£1.75
The Royal Australian Air Force New Zealand	Aero	£1.75
The Messerschmitt Me 109	Aero	£1.18
The Messerschmitt Me 262	Aero	£1.18
The Messerschmitt Bf 110	Aero	£1.18
The Messerschmitt Me 163	Aero	£1.18
Focke Wulf 190	Aero	£1.18
Heinkel He177	Aero	£1.18
Heinkel 100-112	Aero	£1.18
The P-47 Thunderbolt	Arco	£1.25
Planes the Aces Flew	Arco	£1.25
The P-40 Kittyhawk	Arco	£1.25
The Allied Aces of World War Two	Arco	£1.25
Pictorial History of the RAF Vol 1	Ian Allan	£2.00
Pictorial History of the RAF Vol 2	Ian Allan	£2.00
Pictorial History of the Luftwaffe	Ian Allan	£2.00
Test Pilot at War	Ian Allan	£2.50
The British Fighter Since 1912	Putnam	£3.15
The British Bomber Since 1914	Putnam	£3.15
Japanese Aircraft of the Pacific War	Putnam	£5.25
Gloster Aircraft Since 1908	Putnam	£5.25

DUCIMUS BOOKS **30p each**

Camouflage & Markings series:—
Supermarine Spitfire
North American Mustang
Hawker Hurricane
Hawker Typhoon
Gladiator/Gauntlet/Fury/Demon
Gloster Meteor
New—Camouflage & Markings series:—
No 6 De Havilland Mosquito
No 7 Bristol Blenheim

DUCIMUS CLASSICS

No 1 Thunderbolt £1.25
No 2 Spitfire £1.25
order your's now.

KOOKABURRA AIRCRAFT BOOKS

Hawker Hurricane Described
Westland Whirlwind Described
P-47 Thunderbolt (Part I & Part II)
Combat Aircraft of the Battle of Britain
Markings of the Aces, 8th USAAF
LATEST TITLE
Wirraway & Boomerang Markings
only 50p each

AIRCAM AVIATION SERIES **£1.05 each**

No 1	North American P-40 Warhawk
No 2	Republic P-47 Thunderbolt
No 3	North American Mustang Mk I-IV
No 4	Supermarine Spitfire Mk I-XVI
No 5	North American P-51B/C Mustang
No 6	Curtiss (P-40) Kittyhawk Mk I-IV
No 7	Curtiss P-40 Warhawk
No 8	Supermarine Spitfire Mk XII-24
No 9	Spad Scouts S.VII and S.XIII
No 10	Lockheed P-38 Lightning
No 11	Consolidated B-24-M Liberator
No 12	Avro Lancaster
No 13	Nakajima Ki 43
No 14	Republic F/RF-84F Thunderstreak/ Thunderflash
No 15	Boeing B-17B-H Flying Fortress
No 17	North American F86A Sabre
No 18	Nakajima Ki 27A/B
No 19	Hellcat
S1	Battle of Britain
S2	Finnish Air Force Sharkmouth in two volumes
S3	Vol I
S4	Vol II

Men and Machines Series **£1.75 each**

American Fighters, Volume 1
British Bombers, Volume 1
British Bombers, Volume 2
British Fighters, Volume 1
German Bombers, Volume 1
German Bombers, Volume 2
German Fighters, Volume 1
German Fighters, Volume 2
Japanese Navy Bombers

NEW PROFILE PUBLICATIONS

Aircraft

220 Douglas C-47 variants military DC-3 35p
221 Supermarine Spitfires Merlins 35p

AIRCRAFT

AIRCRAFT KITS

New and re-issued

HELLER 1/72

at new low prices

Bloch 152	25p
Dewoitine 520	25p
Curtiss 75	25p
Les Mureaux 117	25p
Caudron 714	25p
Morane 406	25p
Amiot 143	92p
Liore 45	92p
Leo 451	92p
Breguet 693	92p
Bloch 174	92p
Potez 631	92p
Potez 63-11	92p
Bloch 210	£1.25
Arc-en-ciel	92p

REVELL 1/32

Lightning P-38	£1.38
Hurricane	£1.05
Hughes Cayuse	49p
Zero	89p
Aleutian Tiger	89p
Me 109G 'Gustav'	89p
Spitfire Mk I	89p
Curtiss P-40E	89p
Me 109F	89p
Seafire	89p
P-51 Mustang	89p
Wildcat	89p

HASEGAWA 1/32

Focke Wulf Fw 190	£2.50

FROG 1/72

Westland Wessex Mk I	26p
Focke Wulf Ta 152H	19p
Fairey Gannet	26p
Fairey Barracuda Mk II	26p

3 RE-INTRODUCTIONS 1/72

Nakajima Hayabusa Ki-43	19p
Polika5pov I-16	19p
Nakajima Ki-84	19p

HELLER BOAT KITS 1:400

"Potemkine" Soviet Cruiser	£1.60
"Aurore" Soviet Cruiser	£1.60

POST & PACKING

Add 10% to all orders up to £5, minimum charge 10p. Over £5 post and packing free. COD 45p extra.

AVIATION ART BOOKS

12 MAGNIFICENT PAINTINGS

£3.15 EACH BOOK

BOOK ONE

RFC/RAF 1917-37 Aircraft Types:- SE5a Sopwith Snipe, Avro 504K, Bristol Mlc, FE2b, Fairey IIIF, Gloster Gamecock, Westland Wallace, Supermarine Southampton, Handley Page Hereford, Gloster Gladiator, Bristol Bulldog.

BOOK TWO

US Military Aircraft 1917-1934 Aircraft types:- Curtiss Jenny, DH4, "Liberty Four" Breguet 14, Spad XIII, Martin MB-2/NBS-1, Boeing (Thomas Morse) MB-3A, Keystone, B-6A, Boeing PW-9, Curtiss P-6E Hawk Boeing P-12E, Martin B-10B "Flying Whale" Boeing P-26A "Peashooter".

in six colours on heavyweight paper 19in by 14in twelve in each book, with narrative by Charles W. Cain and details of aircraft.

EXPORT DEPT.

B.M.W. EXPORT DEPARTMENT

welcomes orders and enquiries from individuals and traders throughout the world.

BMW MODELS, 327-329 HAYDONS ROAD, WIMBLEDON, LONDON, S.W.19 01-540 7333/4

Published by Ian Allan Ltd, Terminal House, Shepperton, Surrey and printed in the United Kingdom by Crampton & Sons Ltd, Sawston, Cambridge

69